PRELIMINARY ASSESSMENT REPORT

Lockheed Martin Corporation, Missiles and Space Facility
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Sunnyvale, California
94089

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 9
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1.0 EXECUTIVE SUMMARY

The first step in the Resource Conservation and Recovery Act (RCRA) corrective action process is the RCRA Facility Assessment (RFA). The RFA is conducted to assess if a release of hazardous waste or hazardous constituents has occurred from solid waste management units (SWMUs) at the facility. The main components of an RFA are to identify and gather information on releases at the RCRA facility; to evaluate SWMUs for releases to all media (groundwater, surface water, air, and soil); and to make preliminary determinations regarding releases of concern and the need for further actions and interim measures at the facility.

An RFA is currently being conducted for Lockheed Missiles and Space Company, Inc. (Lockheed), located in Sunnyvale, California. A preliminary review of Environmental Protection Agency (EPA) Region 9 and the California Regional Water Quality Control Board (RWQCB) file material on the site was conducted. This report outlines the findings of the preliminary review and identifies areas where additional information is needed in order to make a determination on whether a release has occurred. Figures are contained in Appendix A. The information needs are presented in Appendix B.

Following the completion of the preliminary review, a Visual Site Inspection (VSI) will be conducted at the facility to address information gaps identified in the preliminary review. During the VSI, all SWMUs identified in this report will be inspected, and a file review will be conducted to gather additional information about the facility.

The Lockheed site is a 660-acre facility located in Sunnyvale, California near the southwest shore of the San Francisco Bay. The facility develops and manufactures missile and satellite components primarily for military purposes, thus many of the operations at the facility are classified. Construction of the facility began in 1956, and the first operations started in 1958. The scope and size of Lockheed's operations expanded throughout the Cold War era, but have decreased significantly over the past decade.

Processes that support Lockheed's missile and satellite development operations include metal plating, etching and chemical milling, degreasing, spray painting, printed circuit board manufacturing, chemical processing, and photoprocessing. These operations require the storage and use of acids, bases, metal solutions, solvents, fuel hydrocarbons, and small amounts of radioactive material. These processes primarily generate wastewaters, which are treated in the facility's Central Wastewater Treatment Plant (CWTP) and ultimately discharged to the San Francisco Bay following treatment at a local publically owned wastewater facility. In addition to hazardous waste treatment in the facility's wastewater treatment system, the facility also historically stored hazardous

waste in tanks, containers, and surface impoundments. Lockheed's past RCRA regulatory status is unclear and will be established during the VSI, although the central wastewater treatment plant operated under state permit requirements. Currently, it appears that the facility is a large quantity generator. Information regarding pre-1980 waste management practices is extremely limited and will be researched during the VSI.

Based on a review of file materials, 77 SWMUs and eight AOCs were identified at the site. The SWMUs and AOCs are organized and numbered according to building location at the facility, and are listed in Tables 1 and 2 below, respectively.

Table 1: SWMUs

Building No.	Identified SWMUs
14E/041	SWMU 14E/041-1: Spray Paint Booths (3) SWMU 14E/041-2: Building 14E Former Hazardous Waste Container Storage Facility SWMU 14E/041-3: Solvent Recovery System
071	SWMU 071-1: Plating Area (1) SWMU 071-2: Spray Paint Booths (4)
076	SWMU 076-1: Spray Paint Booth (1) SWMU 076-2: Degreaser (1)
102	SWMU 102-1: Sanitary Wastewater Collection System
103	SWMU 103-1: Plating Areas (1) SWMU 103-2: Degreasers (4) SWMU 103-3: Plating Waste Tanks (WT103-2) (WT103-3) (WT103-4)
113	SWMU 113-1: Degreasers (4) SWMU 113-2: Neutralization Unit
114	SWMU 114-1: Andco Treatment Unit SWMU 114-2: Clarifier/Sludge Thickening Unit/Filter Press SWMU 114-3: Former Hazardous Materials Processing Unit (HMPU) SWMU 114-4: Former Cyanide Destruction Unit SWMU 114-5: Hazardous Waste Container Storage Area
130	SWMU 130-1: Degreaser (1)
132	SWMU 132-1: Solvent Waste Drums
136	SWMU 136-1: Spray Paint Booth (1)

Building No.	Identified SWMUs
138	SWMU 138-1: Vehicle Maintenance Facility
140	SWMU 140-1: Spray Paint Booth (1)
141	SWMU 141-1: Spray Paint Booth (1)
142	SWMU 142-1: Sanitary Sewer Catch Basin
150	SWMU 150-1: Plating Area (1) SWMU 150-2: Spray Paint Booth (1) SWMU 150-3: Degreaser (1)
151	SWMU 151-1: Plating Area (1) SWMU 151-2: Spray Paint Booths (7) SWMU 151-3: Degreasers (11) SWMU 151-4: Methylene Chloride Still SWMU 151-5: Waste Chemical Storage Area SWMU 151-6: Former Waste Diversion System SWMU 151-7: Former Copper Pretreatment Facility
152	SWMU 152-1: Spray Paint Booths (2) SWMU 152-2: Hoist Sump
153	SWMU 153-1: Plating Area (1) SWMU 153-2: Spray Paint Booths (5) SWMU 153-3: Degreasers (7)
153A	SWMU 153A-1: Spray Paint Booth (1)
155	SWMU 155-1: Spray Paint Booth (1)
159	SWMU 159-1: Spray Paint Booth (1)
159C	SWMU 159C-1: Spray Paint Booth (1)
166	SWMU 166-1: Former Automotive Service Station
170	SWMU 170-1: Plating Area (1) SWMU 170-2: Spray Paint Booths (4) SWMU 170-3: Degreasers (2) SWMU 170-4: Waste Beryllium Tank SWMU 170-5: Baghouse Dust Area SWMU 170-6: Process Clarifiers (2) and Underground Sumps (4) SWMU 170-7: Storm Ditch 002 SWMU 170-8: Waste Machinery Oil Tank
171	SWMU 171-1: Incinerator

Building No.	Identified SWMUs
174	SWMU 174-1: Spray Paint Booth (6)
179	SWMU 179-1: Metal Wastewater Sump SWMU 179-2: Former Cyanide Destruction Unit
181	SWMU 181-1: Spray Paint Booth (1) SWMU 181-2: Silver Retention Sump
182	SWMU 182-1: Plating Area (1) SWMU 182-2: Spray Paint Booths (8) SWMU 182-3: Degreasers (5) SWMU 182-4: Plating Waste Tank SWMU 182-5: Former Air Scrubbers SWMU 182-6: Former Floor Grating SWMU 182-7: Former Boiler Room Sump SWMU 182-8: Former Wastewater USTs (3) SWMU 182-9: Acid Retention Sump SWMU 182-10: Metal Process Waste Sumps (3) SWMU 182-11: Waste UST
183	SWMU 183-1: Degreaser (1)
187	SWMU 187-1: Waste Coolant Oil UST
188	SWMU 188-1: Spray Booth(1)
195B	SWMU 195B-1: Spray Booth (1) SWMU 195B-2: Degreaser (1)
562	SWMU 562-1: Degreaser (1) SWMU 562-2: Wastewater Treatment System
Surface Impoundment Cluster	SWMU Surface Impoundment Cluster-1: Evaporation Ponds SWMU Surface Impoundment Cluster-2: Holding Ponds

All known plating operations, spray paint booths, and degreasing operations are identified as SWMUs for the purposes of this report. Additional information about these units will be requested from Lockheed during the VSI. Other units listed above appear to have routinely and systematically discharged waste to the environment based on information in the facility file.

The eight AOCs include areas where contamination from product tanks, process operations, or spill events was identified during the file review.

Table 2: AOCs	
Building No.	**Identified AOCs**
14E/041	AOC 14E-1: Waste Oil Sump/Underground Waste Oil Tank
071	AOC 071-1: Solvent Cleaning Operations (5) AOC 071-2: Solvent Storage Tanks/Underground Storage Tanks (USTs) (2)
104	AOC 104-1: Soil Contamination Area 1 AOC 104-2: Soil Contamination Area 2
109	AOC 109-1: USTs (4)
186	AOC 186-1: Leaded Gas UST
Storm Ditch 001	AOC 001: Storm Ditch 001

The Lockheed site is located approximately one mile from the San Francisco Bay near sensitive wetland areas. Several groundwater plumes and areas of soil contamination have been identified and have been, or are currently being, remediated. Several isolated and site-wide remediation efforts, sampling events, and characterization have been conducted over the past 40 or more years of operation. However, the adequacy of these activities cannot be determined from the file review.

Groundwater extraction is being conducted in the northeast portion of the facility to prevent groundwater contamination in the top two water-bearing zones from migrating off site. Contamination has not been found in the third, deepest groundwater zone. Storm water and runoff from the facility is channeled to a publically owned treatment or enters the wetland areas before reaching the San Francisco Bay.

2.0 INTRODUCTION

2.1 Purpose of the RCRA Facility Assessment

The 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA provide authority in the RCRA program to assist the EPA in implementing corrective action at RCRA facilities. RCRA facilities include all facilities that currently treat, store, or dispose of hazardous waste (or have done so in the past) as regulated under RCRA. HSWA refocused the corrective action program from detecting and correcting future releases from regulated units to cleaning up problems resulting from current and past waste management practices at RCRA facilities. The HSWA corrective action program addresses releases to all media, including groundwater, surface water, air, surface soils, and subsurface soils, both on and off-site, and sources across the entire facility.

The first step in the RCRA corrective action process is the RFA, which consists of an appropriate combination of the following steps: preliminary review of records, VSI, sampling visit, and completion of the final RFA Report. RFAs compile existing information on environmental conditions at a given facility, including information on actual or potential releases. The RFA focuses on obtaining information on the potential that a release has occurred from any SWMU or any other area where wastes have been managed at the facility. A SWMU is defined as any discernable waste management unit at a RCRA facility from which hazardous constituents might migrate, irrespective of whether the unit was intended for the management of solid and/or hazardous waste. The definition includes containers, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, underground injection wells, recycling units, wastewater treatment units, and areas contaminated by "routine, systematic, and deliberate discharges" from process areas. In addition to identifying releases from SWMUs, the RFA should also investigate evidence of spills and/or other releases resulting from waste management activities that may not fit the definition of a SWMU release.

Under Work Assignment No. R09203, EPA Region 9 has requested that Booz Allen Hamilton (Booz Allen) conduct an RFA of the Lockheed facility located in Sunnyvale, California. The first step in preparing the RFA was a file search at the EPA Region 9 office in San Francisco, California and at the RWQCB Region 2 office in Oakland, California. Brief interviews with RWQCB staff familiar with the facility were conducted after the file search. Review of the file materials resulted in this report and the information needs list identified in Appendix B.

2.2 General Procedures Used for Gathering Information

Each of the steps to the RFA requires the collection and analysis of data to support release determinations. During the preliminary review process, existing information is evaluated, such as inspection reports and permit applications, and interviews are conducted with federal and state personnel who are familiar with the facility. Additional information is gathered during the VSI, including visual observation of the site, interviews with the owner/operator, and review of requested file material.

During the file review, oversize figures and tables were not copied to limit resource expenditure. Prior to the VSI, the minimum number of large format figures/tables will be requested to ensure the nature and extent of contamination as it is currently defined is known. A request for large scale maps depicting the extent of contamination and remediation is included in the information needs list in Appendix B.

2.3 Facility Information

The EPA ID number for the facility is CAD009125535. The Standard Industrial Code for the business is 3761, Guided Missiles and Space Vehicles. Lockheed's original RCRA Part A permit application, submitted on November 19, 1980, lists the nature of the business as "missiles and spacecraft manufacturing." The Part A resubmittal, dated December 21, 1984, describes the nature of the business as "treatment and storage of spent plating bath solutions from electroplating operations which are part of missiles and spacecraft manufacturing."[37, 59]

Much of the work conducted at this facility is classified. Therefore, access to many of the buildings is severely restricted by Lockheed's security department.[1]

3.0 SITE DESCRIPTION

3.1 Site Location

Lockheed Martin Corporation Missiles and Space Plant One Facility (Lockheed) is located at 1111 Lockheed Way, Sunnyvale, California 94089. The 660-acre site is located in Santa Clara County, California, in Sections 12 and 13, Township 6 South, Range 2 West (latitude: 37° 24' 10", longitude: 122° 02' 10").[1, 2] (See Figure 1.)

The Lockheed facility lies at the southwest end of the San Francisco Bay within th limits of the Santa Clara Valley Water District and the City of Sunnyvale. Directly to the north are large salt evaporation ponds that were constructed by the Leslie Salt Company in the 1950s and are still active today. The Guadalupe Slough and Moffet Channel also border the site to the north, and are located beyond flood protection dikes north of the site boundary.[35] The slough drains into the San Francisco Bay, which is one mile northwest of the facility. A sanitary landfill for the City of Sunnyvale is located to the northeast of the facility. The Mountain View-Alviso Road (also known as State Highway 237) and Bayshore Freeway (also known as US Highway 101) intersection borders the facility to the south. Moffett Field Naval Air Station adjoins the facility roughly one mile to the west/southwest.[1, 2, 8, 35]

The nearest residence is located in the Orchard Gardens development, less than a quarter mile south of Lockheed, and north of US Highway 101. In addition, there is a mobile home park located east of the Orchard Gardens development.[1] Residential neighborhoods and trailer parks are also located beyond the southeastern border. The proximity of these residential areas to the facility will be determined during the VSI.

Small office and commercial buildings, including buildings associated with the Supertex Inc. site, are situated just outside the eastern boundary of Lockheed. These office facilities were constructed on farmland between 1974 and 1980. Supertex is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site.[1, 2, 8, 35]

3.2 Owner/Operator History

3.2.1 Current Owners and Operators

Lockheed Missiles & Space Company Inc. is a wholly owned subsidiary of Lockheed Corporation. The facility began missile and satellite manufacturing operations in the 1950s. The Lockheed facility in Sunnyvale has several aliases including:

- Lockheed Missiles and Space Company, Inc.
- Lockheed Martin Corporation, Missiles & Space
- The Plant One site
- Lockheed Martin Space Systems Company.[1, 2, 26]

The US Navy owns a 48-acre parcel in the middle of the facility that includes several buildings, notably Building 182. Sold to the US Navy in the late 1950s, this parcel is considered "government-owned and company-operated".[1, 35, 36, 73]

Mathilda Java, LLC, and Sunnyvale Mathilda Land, LLC, acquired parts of the original Lockheed facility within the last decade. See Figure 2 for a depiction of site layout and boundaries as on November 2000.[35] The following table lists the current owners of the 660-acre facility.

Table 3: Current Property Owners

Current Owners	Property Address	Property Description	Dates Owned
Lockheed	1111 Lockheed Martin Way	Currently owns 572 acres of the original 660-acre facility	1950s - present
US Navy	Unknown	48-acre parcel located in the middle of the facility	1950s - present
Mathilda Java, LLC	1302/1350 North Mathilda Avenue	Assessor's Parcel Number 110-26-044. Total of 7.87 acres including Buildings 177 and 178 located on the eastern border of the facility.	1990s - present
Sunnyvale Mathilda Land, LLC	Westside of North Mathilda Avenue straddling 1st Avenue	Assessor's Parcel numbers 110-01-023, and 110-01-030. Total of 34.05 acres including Buildings 160, 161, 162, and 170.	1999 - present
Sunnyvale Mathilda Land, LLC	North of former Building 170	Includes location of former Building 130	1990s - present

3.2.2 Operating History

1950s

Lockheed acquired the majority of the 660-acre parcel, which was being used for agricultural purposes, in the mid-1950s. A short time after acquiring the property, Lockheed sold a 48-acre parcel to the US Navy. Other portions of the facility were owned by B-S-K Associates and the Prudential Insurance Company of America but were leased to Lockheed. In 1956, Lockheed began construction of Building 103, the first building on the Lockheed site. Manufacturing operations started in 1958.[2, 35]

1960s - 1980s

Most of Lockheed's manufacturing and chemical process facilities were running by 1963.[1, 35] From the 1960s until the early 1980s, Lockheed's operations grew and expanded. Facility operations including research, testing, manufacturing, laboratory, and office activities historically took place in 35 permanent large buildings, and approximately 30 smaller fixed and mobile structures.[1, 2, 35] See Figure 3 for a map depicting the Lockheed site in 1981.[20]

1990s - present

During the 1990s, Lockheed reduced the scope of operations and decommissioned several buildings and structures. During this downsizing, Lockheed divested approximately 40 acres of property that was historically, or is currently, impacted by soil or groundwater contamination from the facility operations. All current landowners of the contaminated site are considered responsible parties; however, Lockheed is considered the primary responsible party. The remaining owners are considered secondarily responsible for contaminant cleanup of their properties.[1, 2, 35] See Figure 2 for a map showing the site layout and boundaries as of the year 2000.[35]

3.3 Historical Releases

Numerous references to releases were found in the file material. Table 4 lists releases that are representative of information in the file material. During the VSI, a list of all releases will be requested.

Table 4: Historical Releases

Location	Source	Date of Release/ Detection	Contaminants	Release Information	Remediation Activities
Building 103[53]	Concrete Equipment Vault	Discharge detected on June 19, 1989	Oil and grease	Lockheed notified the City of Sunnyvale of a hazardous materials discharge on September 26, 1989. A monitoring well sample contained 2.2 mg/l oil and grease.	Unknown
Northeast of Building 103[2]	Unknown	July 20, 1987	1,1,1-trichloroethane (TCA)	Between 5 and 15 gallon TCA were spilled onto asphalt.	25 cubic yards of asphalt and soil were removed from the TCA spill area on August 11, 1987. The excavation averaged 2.5 feet in depth.
Building 103[56]	West side security corridor, 55-gallon drum leak	October 23, 1989	Revoplate epoxy	A 55-gallon drum leaked "Tera Gem/Part A (Revoplate epoxy RP 7-0)" for over an hour. Lockheed estimated that several gallons were released.	Lockheed contained and cleaned up the spill, except for material that had already entered the storm drain.
Building 114[72]	5-gallon metal container ruptured	July 5, 1990	30% Hydrogen peroxide	~ 1 liter of hydrogen peroxide was released. The spill occurred in an area that had secondary containment.	Release occurred in a contained area and was cleaned-up.

Table 4: Historical Releases					
Location	**Source**	**Date of Release/ Detection**	**Contaminants**	**Release Information**	**Remediation Activities**
Building 151 'backyard area'	Unknown	Unknown	Motor oil	Release of motor oil to the soil was reported during a 1993 facility closure.	Contamination reportedly existed at a depth of 4 feet and was subsequently excavated.
West of Building 170[2]	Baghouse dust collection area		Beryllium	In October of 1987, Lockheed documented the release of one third of a pound of beryllium turnings and debris.	Samples collected from the spill area contained 3.2 to 10.6 percent beryllium by weight. Lockheed performed a series of excavations in this area. In 1998, during closure of Building 170, additional sampling and excavation was conducted until confirmation samples were within background levels.[2]

Table 4: Historical Releases					
Location	**Source**	**Date of Release/ Detection**	**Contaminants**	**Release Information**	**Remediation Activities**
Building 170[62]	Bullard #4 concrete coolant sump	November 6, 1997	Synthetic coolant: no constituents identified	The concrete coolant sump typically holds coolant to a depth of 1-2 feet and has a capacity of approximately 200 gallons. The amount of coolant loss is not known.	The sump was drained on November 10, 1997. Lockheed planned to seal the sump followed by integrity testing prior to reuse; however it is unknown whether this action was completed. Depth to groundwater beneath the sump is approximately ten feet. Lockheed indicated that the groundwater extraction system operating directly downgradient would capture any contamination.
Building 182[54]	Plating tank	October 17, 1989	Chromic acid	Earthquake caused approximately 200 gallons of chromic acid to spill from a plating tank into the street and parking area.	No specific information was found in file material.

Table 4: Historical Releases					
Location	**Source**	**Date of Release/ Detection**	**Contaminants**	**Release Information**	**Remediation Activities**
Stormwater Ditch 001[76]	Solution Line	June 11, 1990	Nitrate, Diethylamino-ethanol	Approximately 2,000 gallons of chilled solution containing 200 ppm nitrate, and an unknown concentration of diethylaminoethanol were released when a chilled water line was ruptured. The water entered Drainage Ditch 001, which empties into the wetland area. See Figure 10 for a depiction of the spill area and sampling locations.	Drainage Ditch 001 was diked with dirt to contain the release. Several hundred gallons of solution pooled in a flatland area. Material released was pumped from the ditch and pooled area. No characterization data of the waste was located during the file review; however, soil samples were collected from the standing liquid at the pipe break, the drainage ditch, the flatland past the berm, and from the wetlands bird pond.

3.4 Processes

Processes that support Lockheed's missile and satellite development operations include metal plating, etching and chemical milling, degreasing, spray painting, printed circuit board manufacturing, chemical processing, and photoprocessing. These operations require the storage and use of acids, bases, metal solutions, solvents, fuel hydrocarbons, and small amounts of radioactive material.[1] Table 7 lists information about the known locations of plating areas, spray paint booths, and degreasers. Overall, the file material contained limited information about Lockheed's manufacturing and development processes. Additional information on these process will be requested during the VSI.

Etching, Chemical Milling, and Metal Plating

Lockheed performs non-electrode plating and electroplating of common and precious metals, including nickel, chromium, copper, zinc, lead and iron at several locations throughout the site (see Table 7). File sources indicate that there are between seven and nine plating shops located at the facility in various buildings.[1,2] No specific descriptions of the etching, chemical milling, and metal plating performed at the facility were found during the file review; however, a generic description of electroplating, electroless plating, anodizing, coating, and chemical etching and milling is provided in Appendix C, *Guidance Manual for Electroplating and Metal Finishing Pretreatment Standards.*

Degreasing

Degreasing operations of varying magnitude are located in 39 areas throughout the site. The degreasing units range from small table-top units to large units used for the metal parts assembled in manufacturing operations. Solvents used to degrease parts include: TCA, Freon-113, Freon TF, Freon RES, and Alpha 565. See Table 7 for the location of the degreasing units.[1, 2]

Spray Painting

Approximately 50 spray booths in 19 buildings were identified at the facility.[1] No information on the operations, or the types and amounts of associated wastes were found in the file material.

Printed Circuit Board Manufacturing

Lockheed manufactures printed circuit boards; however, information indicating the location of circuit board manufacturing, quantities of waste generated, and waste handling was not available. No specific descriptions of the circuit board manufacturing processes at the facility were found during the file review; however, a generic description of printed circuit board manufacturing is contained in Appendix C.

Chemical Processing

In 1981, Lockheed indicated that there were six chemical processing facilities and 100 plating lines. The chemical processing units were identified in Buildings 103, 150, 151, 159, 170, and 182. No additional information was present in the file material.

Photoprocessing

Photoprocessing was conducted at the facility; however, the location of the photoprocessing, the amount of waste generated, and the disposition of waste were not described in the file material.[23]

3.5 Waste Management

File material contained very limited information on the wastes generated and their management at the facility. Information on the waste management will be requested during the VSI.

Waste streams that Lockheed currently handles, or has historically handled, are listed in Table 5.

Table 5: RCRA Wastes Codes Handled

EPA Hazardous Waste No.	Contaminant or General Description	Part A Estimated Annual Quantity
D001	Ignitability	13 tons [37]
D002	Corrosive	7 tons [37] 3,000,000 lbs. [59]
D006	Cadmium	Unknown [38]
D007	Chromium	3,000,000 lbs. [59]
D008	Lead	Unknown [38]
D011	Silver	Unknown [38]
F001	Spent solvents	57 tons [37]
F002	Spent solvents	8,250 lbs. [37]
F003	Spent solvents	833 lbs. [37]
F004	Spent solvents	250 lbs. [37]

EPA Hazardous Waste No.	Contaminant or General Description	Part A Estimated Annual Quantity
F005	Spent solvents	3 tons [37]
F006	Plating wastes	4 tons [37]
F007	Plating wastes	900 tons [37]
F008	Plating wastes	50 tons [37]
F009	Plating wastes	1,150 tons [37]
F010	Plating wastes	1,666 lbs. [37]
P015	Beryllium powder	4 tons [37]
P030	Cyanides	6,800 lbs. [37]
P104	Silver cyanide	830 lbs. [37]
P106	Sodium cyanide	6,800 lbs. [37]
U002	Acetone	416 lbs. [37]
U013	The U013 listing for asbestos is not currently regulated.	50 lbs. [37]
U019	Benzene	83 lbs. [37]
U112	Ethyl acetate	10 lbs. [37]
U134	Hydrofluoric acid	33.2 lbs. [37]
U151	Mercury	8.33 lbs. [37]
U154	Methanol	1,666 lbs. [37]
U186	1-Methylbutadiene	8.3 lbs. [37]
U211	Carbon tetrachloride	166 lbs. [37]
U213	Furan, tetrahydro-	833 lbs. [37]
U220	Benzene, Methyl-	2,500 lbs. [37]
U223	Benzene, 1,3-diisocyanatomethyl-	166 lbs. [37]
U226	Methyl chloroform	833 lbs. [37]
U228	Trichloroethylene	208 lbs. [37]

EPA Hazardous Waste No.	Contaminant or General Description	Part A Estimated Annual Quantity
U229	The listing U229 applied to trichlorofluoromethane. This listing is no longer applicable (* U229 was promulgated in an Interim Final Rule on May 19, 1980 (45 FR 33084). On November 25, 1980 (45 FR 78532), the U229 listing was deleted)	83 lbs. [37]
U239	Benzene, dimethyl-	210 lbs. [37]

In addition, it appears that Lockheed may have received waste from off-site locations; however, the types and amounts of waste, and the dates that the waste was accepted, are unknown.[91]

The bulk of Lockheed's waste streams are wastewater or wastewater treatment sludges. Typical waste streams generated at the facility include:

- Metal bearing wastewater streams
- Acidic or alkaline wastes not containing metals
- Metal-bearing sludge produced through treatment of wastewaters
- Spent or off-specification process solutions
- Laboratory waste
- Maintenance wastes.[38]

Various processes have been used over the years to treat hazardous and nonhazardous waste. Limited information was present in the file material regarding Lockheed's waste handling practices prior to 1980.

According to the original Part A application, Lockheed stored 64, 010 gallons/year of hazardous waste in tanks, 36,585 gallons/year of hazardous waste in containers, and 42,500 gallons/day of hazardous waste in tanks.[37]

In addition, Lockheed stored wastewater in a cluster of four surface impoundments prior to discharge to the City of Sunnyvale's Publically Owned Treatment Works (POTW). Two of these impoundments received hazardous waste; the remaining two received only non-hazardous waste. Lockheed also operated an on-site incinerator, which primarily accepted non-hazardous waste. Waste treatment and storage processes are described below.[1,2]

Wastewater Treatment

A significant portion of the facility's waste is piped or trucked to Building 114. Building 114 was constructed in 1986 and contains the Central Wastewater Treatment Plant, a cyanide destruction unit, and a less that 90-day waste chemical drum storage area. Specifically, Building 114 contains the following waste treatment/processing units:

- Andco Treatment Unit (SWMU 114-1)
- Clarifier/sludge thickening tank/filter press (SWMU 114-2)
- Hazardous Material Processing Unit (SWMU 114-3)
- Cyanide destruction unit (SWMU 114-4)
- Large Quantity Generator (LQG) container storage area (SWMU 114-5).[2]

The Andco treatment unit was the first stage of pre-treatment for rinsewaters, wastewaters, and other process-related solutions. Plating wastes are piped to the Andco treatment unit from Buildings 071, 103, 150, 151, 159, 170, and 182. At least one plating operation discharges metal finishing effluent directly to the POTW.[1] The amount and types of wastes that are accepted from other portions of the facility were not identified in the file material. Pre-treatment activities in the Andco unit include: 1) neutralization of liquid corrosive metals, and 2) electrochemical reduction of hexavalent chromium to trivalent chromium.[1,2] Additional information on the disposition pathway for all the plating operations will be requested during the VSI. A schematic of the wastewater treatment process is shown in Figure 5; however, this diagram was created in 1981 and depicts the proposed treatment process. Additional information will be requested to verify the treatment process.[20]

Following pre-treatment, the wastewater is piped to the Clarifier/Sludge Thickening Unit/Filter Press (SWMU 114-2) where solids are precipitated from the wastewater. The effluent wastewater is routed to the surface impoundment cluster. The metal hydroxide sludge generated during the course of the treatment train is transferred to the Building 114 LQG storage area (SWMU 114-5). Information about the locations of past storage of this sludge will be requested during the VSI.

Surface Impoundment Storage

Wastewater from the CWTP and other wastes from the facility are stored in a cluster of four surface impoundments prior to discharge to the City of Sunnyvale's POTW. Two of these surface impoundments, the Evaporation Ponds (SWMU Surface Impoundment Cluster-1), were considered RCRA surface impoundments, but were not identified in either the facility's original or resubmitted Part A application. The remaining two surface impoundments are classified as Class II, nonhazardous waste impoundments, and are referred to as the Holding Ponds (SWMU Surface Impoundment Cluster-2).

The Holding Ponds began operation in 1983 and are still in operation. The hazardous waste surface impoundments began operation in 1983 and were closed in 1985.[1,2]

A diagram of the wastewater treatment process prior to surface impoundment operation is depicted in Figure 4.[20] Additional information regarding wastewater management prior to surface impoundment operation will be requested during the VSI, as well as information on wastewater management after the impoundments were closed.

Printed Circuit Board Manufacturing Wastes

Wastes from circuit board manufacturing are neutralized in the Building 113 elementary neutralization unit (SWMU 113-2). The neutralization unit is a three-staged concrete bermed unit that utilizes sulfuric or hydrofluoric acid for neutralization. Following neutralization, it appears that waste from printed circuit board manufacturing is discharged directly to the city sewer.[2] The disposition pathway for these wastes prior to, during, and after, the evaporation ponds were operated is not clear from the available material. It is also unclear which buildings generate printed circuit board manufacturing wastes. Additional information will be requested during the VSI.

Spent Solvents

Two solvent recovery units were identified at the facility. The solvent recovery unit in Building 151 recovery methylene chloride.[90] It is unclear what type of solvent(s) the second unit, which is located in Building 102, recovers. No information was found in the file material indicating the disposition of solvent heels, or the regulation of air emissions from these units. Additional information about the disposition of spent solvents and the solvent recovery units will be requested during the VSI.

Waste Storage

According to the Part A application, Lockheed stored 64,010 gallons/year of hazardous waste in tanks. These tanks are located both above ground and below ground and store a variety of wastes including beryllium, waste oil, and plating wastes.[1,2] The number, capacity, and operational history of these tanks will be established during the VSI.

Stormwater

Stormwater Ditches 001 and 002 discharge to the Lockheed and Moffett Channels that run along the northern end of the facility and ultimately discharge to Guadalupe Slough. Historically, cooling water blowdown was discharged through these channels to the slough. File information indicates this practice has been discontinued. Dates when this occurred will be determined during the VSI.[1]

Container Storage

Site 14E was used from 1959 until 1986 to store hazardous wastes and recyclable materials. The primary collection site for hazardous waste from 1986 until the present is in Building 114.[2]

Incineration

Factory refuse was combusted in the Building 171 incinerator. This factory refuse consisted primarily of waste paper and cardboard; however a small portion of the combusted waste was considered RCRA hazardous. No indication of the years of operation was found in file material.[37, 59, 40]

Underground Storage Tanks (USTs)

Seven double-walled petroleum USTs were actively used at Lockheed as of 1999. The location of these tanks, as well as several former USTs, are included in Figure 6.[2,96]

4.0 REGULATORY INVOLVEMENT AND VOLUNTARY ACTIONS

The following federal, state, and local agencies are involved in regulatory oversight of the Lockheed facility:

- US EPA
- Department of Health Services (DHS)
- Regional Water Quality Control Board (RWQCB)
- Bay Area Air Quality Management District (BAAQMD)
- City of Sunnyvale.[1]

Limited information was present in the file material regarding regulation of air emission sources at the site. File review indicates that BAAQMD issues permits for individual degreaser units and spray paint booths, and is primarily concerned with solvent usage and spray paint booths at the facility.[1] Copies of the permits will be requested during the VSI.

In addition to state and federal regulations, Lockheed is also subject to the City of Sunnyvale's municipal hazardous material storage and closure codes. These requirements are outlined in Titles 20 and 21 and are enforced by the City of Sunnyvale Fire Prevention Bureau. Lockheed currently holds the following two permits with the City of Sunnyvale for discharge to the POTW:

- A facility-wide permit that covers 98 buildings at the Lockheed facility (twelve of these buildings have "long form" status because the wastewater may contain contaminants)
- A permit for direct discharge to the POTW from the Building 113 semiconductor operation.[1,2]

In addition, Lockheed historically held a permit for discharge of waste generated from the Building 195B metal finishing research operation.[1]

4.1 Compliance and Permit History

Table 6 provides a chronological history of compliance and permitting events associated with the facility.

Table 6: Permitting/Compliance History	
Date	**Compliance/Permitting Activity**
1958	Lockheed manufacturing operations began.[1]
1976	RWQCB issued Lockheed NPDES permit CA0005754, WDR Order No. 76-75, covering discharge of site runoff through four stormwater channels to the Guadalupe Slough.[1]
August 18, 1980	Lockheed submitted Notification of Hazardous Waste Activity.[1]
November 19, 1980	Lockheed submitted Part A application for Hazardous Waste Permit (EPA Form 3510-3) indicating tank and container storage, tank treatment, and incineration.[37]
1981	RWQCB issued Board Order 81-67, which required monitoring of the Process Wastewater Treatment and Reclamation Facility (PWTRF).[81]
April 17, 1981	Lockheed submitted a revised Part A.[41]
February 14, 1983	Lockheed requested rescission of ISD because it no longer considered itself a hazardous waste "facility." The facility asserted that it no longer stored hazardous waste on site for more than 90 days.[91]
November 15, 1983	The State of California RCRA conducted an overview inspection and found Lockheed in violation of container storage and closure plan requirements.[44]
February 29, 1984	The Toxic Substances Control Division of the CA Department of Health Services issued a notice of violation pursuant to Section 3008 of RCRA. The violations identified were primarily administrative and included violation of container maintenance and labeling requirements and closure plan specifications.[44]
July 24, 1984	DHS rescinded Lockheed's ISD for the Central Wastewater Treatment Plant based on the facility's assertion that this unit was covered under the definition of an Elementary Neutralization Unit (ENU).[2]
August 24, 1984	DHS rescinded Lockheed's ISD requirements for tank and container operations based on Lockheed's assertion that it no longer stored hazardous wastes for more than 90 days. Lockheed's two surface impoundments (evaporation ponds) were the only remaining units regulated under the ISD.[91]

Date	Compliance/Permitting Activity
September 28, 1984	EPA formally requested Lockheed's RCRA Part B permit application for the facility's surface impoundments. (Note: Container and tank storage and treatment were regulated by Department of Health Services at the time that this letter was sent. Thus, US EPA only requested Part B information about the surface impoundments.[42]) The deadline cited in the formal request memorandum was April 1, 1985.[42]
May 21, 1985	DHS inspection yielded several violations of California's Hazardous Waste Control Act (HWCA).
November 8, 1985	Lockheed lost interim status for the two hazardous waste surface impoundments. However, Lockheed held that the waste that was in the evaporation ponds was treated and dewatered by September 30, 1985. Treatment was complete by October 30, 1985. Further, it indicated that the non-sewerable slurries and sludges were being disposed as hazardous waste to a Class I disposal facility.[48] (Note: The facility never mentioned that the hazardous waste was removed from the evaporation and disposed, or that the surface impoundment was clean-closed prior to the November 8, 1985 date. Because the facility had not yet clean-closed the surface impoundment, the unit was still holding a hazardous waste and could be considered in violation for storage of hazardous waste without a permit or interim status.)
January 14, 1986	DHS denied Lockheed's application for a variance for the Andco wastewater treatment unit.[43]
May 19, 1986	Lockheed applied for a variance from the storage requirements for 17,800 gallons of beryllium waste.[52]
May 28, 1986	DHS denied Lockheed's variance application for the beryllium storage requirements.[52]

Date	Compliance/Permitting Activity
October 24, 1986	DHS filed a Complaint for Civil Penalties.[91] Specifically, DHS alleged that Lockheed: 1) accepted hazardous waste materials from off site (2/1/85 - 12/17/85); 2) stored hazardous waste from off site (2/1/85 - 5/28/86); 3) operated the Andco wastewater treatment unit without a permit (10/85 - 12/85 in violation of HWCA section 25201); 4) stored hazardous waste beryllium for greater than 90 days (11/7/85 - 8/19/86 in violation of HWCA 25201); 5) stored more than 5,000 gallons of beryllium in a single tank without a permit (1/1/86 - 8/12/86, in violation of 25123.3 of the Health and Safety Code and HWCA 25201); 6)stored hazardous waste materials other than beryllium on site for over ninety days (May 21, 1985 - May 20, 1986 in violation of section 66508); and 7) operated a cyanide destruction unit, copper removal unit, steam cleaning sedimentation unit, air stripping unit, silver recovery unit, and chromium reduction unit without a permit, or determination that the treatment units do not produce hazardous waste (December 9, 1985 - June 3, 1986 in violation of 25201 of the Health and Safety Code).[91] In addition, Lockheed failed to: 1) create and follow a waste analysis plan; 2) develop, and submit a closure plan for the entire facility until June 26, 1986; 3) maintain records for any part of the facility; 4) correctly label hazardous waste containers; 5) close hazardous waste containers properly; 6) separate incompatible wastes; 7) develop and follow a schedule for inspecting equipment; 8) comply with hazardous waste training requirements; 9) have a contingency plan for its transfer facility (that stored wastes from off site), its Andco treatment facility, its drum and tank storage areas; 10) maintain proper aisle space in its container storage area; 11) follow requirements for posting signs to warn of danger in the active portions of the facility; 12) keep or submit a closure cost estimate document at the facility; 13) file an annual report; 14) notify DHS of modifications of existing facilities; 15) develop and maintain an annual cost-estimate of post-closure monitoring and maintenance; and 16) containerize five pieces of beryllium-contaminated ducting waste.[91, 59]
March 10, 1986	Lockheed submitted a revised Part A.[1] (Note: A revised Part A from 1986 was not found in the reference material.)
May 29, 1986	The RWQCB and DHS conducted a compliance evaluation inspection.[58]
March 10, 1987	CA DHS issued Lockheed a five-year HW Facility Permit for portions of the Central Wastewater Treatment Plant and various transfer pipelines. The permit became effective on March 10, 1987.
July 31, 1987	DHS certified clean closure of the two hazardous waste surface impoundments.[2]

Date	Compliance/Permitting Activity
September 25, 1987	A Consent Agreement and Order was issued for administrative violations related to hazardous waste management activities. [1]
January 20, 1988	RWQCB adopted Site Cleanup Requirements, Order No. 88-13. The order identified Lockheed as the sole discharger at the site, required Lockheed to characterize the geology and hydrology of the site and define the extent of soil and groundwater contamination.[1,2]
February 22-23, 1988	DHS conducted an inspection. The following violations were found: • Hazardous waste drums outside of Buildings 187 and 151 were open, or not properly closed • Administrative violations.[75]
March 17, 1988	DHS granted a treatment variance for an ENU to handle circuit board wastes in Building 113. DHS also granted a Research, Development, and Demonstration (R&D) variance for a fluorescent light crusher.[1]
May 19, 1988	Lockheed applied with the DHS for a variance for a solvent recovery unit to be operated in Building 102. (This variance had not been granted as of 1990).[1]
June 30, 1988	The R&D variance for the fluorescent light crusher expired.[1]
September 8, 1988	Lockheed applied for a modification to the Building 113 ENU variance to allow the treatment of other acids, caustics, and oxidizers.[1]
November 3, 1988	DHS denied the ENU variance modification request.[1]
June 21, 1989	RQWCB adopted Order No. 89-106, requiring Lockheed to initiate a groundwater self-monitoring program. This order replaced Order 81-67.
January 1990	BAAQMD conducted an audit at the facility.[1]
May 17, 1990	Lockheed applied to DHS for a variance of hazardous waste permit requirements for: • Electrochemical and physical treatment in the existing Andco unit (Building 114) • Upgrade of the HMPU (Building 114) • Cyanide destruction in the cyanide destruction unit • Storage of hazardous waste in tanks in containers for more than 90 days (Building 071).[38]

Date	Compliance/Permitting Activity
June 19, 1990	DHS approves variance for: • Electrochemical and physical treatment in the existing Andco wastewater treatment unit • Upgrade of the HMPU in Building 114. DHS denies variance for: • Treatment of cyanide in the cyanide destruction unit without a permit (Building 114) • Storage of hazardous waste for greater than 90 days (Building 071).[38]
December 6, 2000	RWQCB issued order No. 00-124. The purpose of this order is to: 1) establish cleanup standards for groundwater contamination that exists at the site, and 2) establish requirements for evaluating the effectiveness of the final remedy at cleaning up groundwater contamination. Order No. 00-124 updates site cleanup requirements that were adopted in Regional Board Order No. 88-013 on January 20, 1988.[35]

4.2 Voluntary Actions

Lockheed first installed groundwater monitoring wells at the facility in 1969; however, it is unclear whether this monitoring was requested by a state or local regulating agency.[2] Additional information about actions voluntarily undertaken by Lockheed will be requested during the VSI.

5.0 ENVIRONMENTAL SETTING

The Lockheed facility is located in the central portion of the Santa Clara Valley. The valley extends to the San Francisco and is bounded the Santa Cruz mountains to the west and the Diablo Range mountains to the east.[23]

5.1 Topography

The site slopes gently and uniformly downward from 30 feet at the south end of the facility to the north boundary levee at four feet mean sea level (MSL). The average slope gradient is approximately 0.8 percent.[7,20]

5.2 Geology

Regional Geology

The Lockheed facility lies on approximately 1,000 feet of unconsolidated alluvial sediments deposited during the Quaternary Period, underlain by the Santa Clara Formation of Plio-Pleistocene age.[5, 23, 25]

The Quaternary alluvium extends from a few feet to 200 feet and is generally unconsolidated, composed predominantly of sand, silt, and clay with minor gravel lenses. The valley alluvial fans are dissected by stream channels. Many of these stream channels are now buried, forming various preferential conduits for the movement of groundwater.[5, 23, 25]

The Santa Clara Formation was formed as a continental deposit and grain size ranges from clay particles to boulders. The formation consists of interbedded non-marine conglomerates, sandstone, and claystone.[5, 23]

Vast accumulation of sediments has resulted from movement and tectonic downwarping along two major fault zones located on each side of the Santa Clara Valley. The San Andreas fault passes ten miles to the southwest of the Lockheed facility, the San Gregorio fault lies about 23 miles to the southwest. Along the eastern side of the Santa Clara Valley are two active faults: the Hayward and Sunol faults, which lie 8 and 12 miles northeast of the Lockheed facility, respectively. Several smaller but potentially active faults exist in the Santa Clara Valley but do not appear to contribute significantly to seismic hazard. These faults include the Silver Creek, Santa Clara, Crosley, Coyote Creek, Quimby, Berryessa, Piercy, Cascade, and Edenvale faults.

Metasedimentary, igneous, and metamorphic bedrock of the Jurassic Franciscian Group and Knoxville Formations underlie the Santa Clara Valley at depth. Older bedrock in

the area has been highly deformed and fractured by folding and faulting. The bedrock is overlain by Cretaceous and Tertiary marine, continental and igneous deposits, and topped by the alluvial sediments described above.[23]

Local Geology

Upper sediment layers in the vicinity of the Lockheed site are characterized by a shallow vadose zone, underlain by the heavy and relatively impermeable Alviso clay, which is synonymous with the bay mud. This clay layer typically consists of six to ten inches of dark gray calcareous, very alkaline clay. The surface soil transitions into dark grayish-brown, calcareous subsoil of fine clay texture. Lime content increases with depth in the subsoil and is present throughout the surface soil. Below the dark upper clay layer is a lighter grey, fine, highly calcareous layer that contains brown, blue, and green mottles. The soil has a high void ration in the range of 2 to 3 with a porosity of about 60 percent, and water content of approximately 100 percent. The dry unit weight of the soil is approximately 40 pounds. Laboratory testing of undisturbed soil indicates that the clays exhibit low plasticity and permeability of 10^{-7} to 10^{-8} centimeters/second. Groundwater is typically encountered between four and ten feet below ground surface (bgs).[5, 23, 3, 19]

5.3 Hydrology

Surface water and groundwater move primarily from the highlands surrounding the valley toward the San Francisco Bay.[23]

5.3.1 Groundwater

Water Bearing Zones

Three water-bearing zones exist below the Lockheed site:

- The first transmissive zone spans from 5-25 feet bgs and is generally composed of five to ten feet thick sequences of moderately to highly conductive materials interbedded with thin lenses of less conductive materials. Groundwater in this zone has been impacted by facility operations. The primary contaminants are volatile organic compounds (VOCs) (e.g., trichloroethylene [TCE]) and metals (e.g., chromium).[26]
- The second transmissive zone is located at a depth interval of 25-55 feet bgs and is characterized by 5-15 feet thick sequences of moderately to highly conductive materials in less conductive materials Groundwater in this zone has also been impacted by facility operations. The primary contaminants are VOCs (e.g., TCE) and metals (e.g., chromium).[26]

- The third transmissive zone is located 100-160 feet bgs and provides high quality water.

A groundwater extraction system was installed in 1992 to prevent or minimize the amount of contaminated groundwater migrating off-site. Additional information on the extraction system will be requested during the VSI.

Groundwater Flow

Prior to installation of a groundwater extraction system in 1992, the groundwater flow beneath the site moved toward the northeast at a velocity of about 3.6 feet per day, with a more eastward component in the area north of Building 170.[23, 26] Groundwater flow direction remains to the northeast except in the vicinity of Buildings 170 and 178, where the groundwater extraction systems radically impact groundwater flow.[26] Groundwater flow patterns have remained consistent since the groundwater extraction system was installed.[26]

Hydraulic Gradient

The hydraulic gradient in the first two zones is between 0.006 and 0.007 feet per foot (ft/ft) in the southern portion of the site and between 0.002 and 0.003 ft/ft in the northern area of the site. Based on limited data, the average hydraulic gradient in the third transmissive zone is approximately 0.0009 ft/ft.[26]

Hydraulic Interconnection and Migration of Contaminants

Hydrologic and water quality data suggest that the thickness and depth of the layer that separates the first and second transmissive zones differs significantly across the site. However, the first and second transmissive zones appear to be hydraulically interconnected over much of the Lockheed site. Some saltwater intrusion from the San Francisco Bay has been noted in these zones.[5,26]

Materials encountered between the second and the third transmissive zones, at depths between 55 and 100 feet bgs, consist mainly of low permeability materials. These lenses are saturated and have the potential to provide a possible lateral migration pathway for chemicals.[1] The potential for migration of contaminants from the first two transmission zones to the third is also limited by the upward hydraulic gradient between the second and third transmissive zones.

Although, a hydraulic separation may exist between the interconnected uppermost zones and the third zone, there are documented instances where old irrigation wells have provided a conduit for contaminant migration to the third transmissive zone within two miles of the Lockheed site.

Municipal Wells

The City of Sunnyvale, population 118,000, uses several local groundwater wells to supplement water obtained from the Hetch-Hetchy Reservoir in the Santa Clara Valley Water District. The closest of these nine wells is located 1.5 miles south of the southern boundary of the Lockheed site. Water from this well is part of a blended system that services the entire population of Sunnyvale. Groundwater, however, provides only 25 percent of the drinking water used by the Sunnyvale system.[1]

The City of Mountain View operates municipal wells that draw from the third transmissive zone. Three of Mountain View's wells, Wells 18, 19, and 30, are located just two miles southwest of the Lockheed site with Well 18, being the closest at approximately 1.7 miles southwest of the site's southern boundary.[1]

Lockheed Site Groundwater Characterization: 1987 - present

In response to a March 5, 1987 request to Lockheed from the RWQCB, a site-wide groundwater investigation was initiated to determine the extent of groundwater contamination below the site. Groundwater characterization was conducted in three phases, beginning in September 1987. The results of Phase I of the groundwater characterization investigation were used to identify contaminant distributions and to identify the locations for installation of monitoring wells to delineate the lateral extent of the groundwater contamination in the first transmissive zone. Based on the results of these initial investigations, the RWQCB issued Order No. 88-013, on January 20, 1988 requiring further investigation to determine the extent of contamination. Phases II and III were performed to more fully delineate the extent of groundwater contamination, laterally and vertically. Site-wide groundwater characterization was completed in 1990. On December 6, 2000, the RWQCB rescinded Order No. 88-013 and issued Order No. 00-124 which: 1) established cleanup standards for groundwater contamination that exists at the Site due to facility operations; 2) establishes requirements for evaluating the effectiveness of the final remedy for cleaning up the groundwater plumes; and 3) implemented an expanded sampling schedule, which is outlined in the Lockheed's self monitoring plan (SMP). This plan requires quarterly monitoring at 11 extraction wells and semi-annual monitoring of potentiometric surface elevations at 87 monitoring wells.[2, 26]

Contaminant Plumes and Groundwater Extraction System

Characterization efforts reveal several chemical contaminants in the first and second transmissive zones including:

- VOCs, primarily TCA and TCE, but also perchloroethylene (PCE), Dichloroethene DCE (1,1- DCE and cis- 1,2-DCE), chloroform, and trichlorofluoromethane (TCFM)

- 1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)
- Hexavalent chromium
- Nitrate
- Bromodichloromethane (BDCM).[8, 26, 35]

The third, deeper transmissive zone is thought to be contaminant free.

Off-Site Contamination

According to a report requested by JSR Microelectronics, who owns the adjoining property on the east boundary of Lockheed, the Lockheed plume extends off site in the northeast direction impacting groundwater under Buildings 563 and 564.[8] Known contaminants include TCA, TCE, PCE, 1, 1, DCE, chloroform, TCFM, Freon 113, and hexavalent chromium. In addition, BDCM was detected at 1.5 ppb in groundwater according to a 1995 study by IHI.[8, 26]

5.3.2 Surface Water

Nearby Water Bodies

San Francisco Bay is the main body of water within three miles of the Lockheed site. Tidal marshes and the Guadalupe Slough form the northern border of the Lockheed facility. These wetlands have been proposed for addition to the San Francisco Bay National Wildlife Refuge. The Leslie Salt Company brine ponds are located in close proximity to the site.[1,2,5]

Stormwater Runoff

Two drainage ditches channel stormwater from the site: Storm Ditch 001 and Storm Ditch 002. Storm Ditch 001, runs to the east of the surface impoundment cluster and Building 175. This stormwater channel receives both stormwater runoff as well as significant quantities of discharge from the site on a fairly consistent basis. Storm Ditch 002 runs along the east side of Building 170. This Ditch is only used for storm water runoff and does not receive a significant quantity of flow on a consistent basis.[1]

Stormwater runoff from the Lockheed site drains into the Lockheed Channel which runs along the northern boundary of the site. The Channel is regulated by the Lockheed Pump State located approximately 1,500 feet from the northeastern boundary of the site, adjacent to the City of Sunnyvale Landfill (see Figure 2). Water from the channel is pumped to the Guadalupe Slough which ultimately drains to the San Francisco Bay.[1]

Flood Potential

High tides and on-site generated stormwater runoff are possible sources of flood threat to the facility. The 100-year high tide elevation determined by the US Army Corps of Engineers for Moffett Field is 7.5 ft. above MSL, which is over the top of the levees at Lockheed's north boundary, and could potentially inundate the areas below 7.5 ft MSL.[5]

5.4 Climate

5.4.1 Precipitation

The mean annual precipitation in the vicinity of Lockheed is approximately 12 inches per year. The estimated maximum 24-hour precipitation in the vicinity of the site is about 3.8 inches for a 100-year return period and 2.3 inches for a 5-year return period. Based on over 40 years of recorded precipitation data, the estimated maximum annual precipitation is 22.5 inches for a 100-year return and the estimated minimum annual precipitation is 4.9 inches for a 100-year return. The maximum rainfall between 1941 and 1980 was 19.4 inches and occurred in 1952. Rain, the most common form of precipitation in this region, is concentrated in the winter months between November and March. Recharge by precipitation occurs in December and January.[5,20]

The average annual net evaporation was recorded at the Leslie Alviso Salt Ponds northeast of the Lockheed site. According to this data, net evaporation is measured at about 43 inches annually and the gross evaporation is approximately 55 inches annually.[20]

5.4.2 Temperature

The local climate is mild. The approximate average temperature at the facility is 58 °F, with the highest average temperature of 78 °F occurring in July, and an average low temperature of 43 °F occurring in January.[93]

5.4.3 Wind

Prevailing winds in the neighboring City of Mountain View are north-northwesterly during the day and more from the west in the evening. Winds are typically lightest during the fall and winter seasons. When winds are very light for several days, pollutants may build up locally.[97]

5.5 Ecological Receptors

The San Francisco Bay is used for commercial and recreational fishing, estuarine habitat, shellfish harvesting, fish migration, migratory waterfowl refuge, navigation, industrial service supply, water contact and non-contact recreation, and wildlife habitat. The tidal wetlands and sloughs adjacent to the Lockheed site are habitat for six federally-listed endangered species: the salt marsh harvest mouse (*Reithrodontomys raviventris*), the California clapper rail (*Rallus longirostris obsoletus*), the California black rail (*Laterallus jamaicensis cotruniculus*), the California brown pelican (*Pelecanus occidentalis californicus*), the American peregrine falcon (*Falco peregrininus anatum*), and the snowy plover (*Charadrius alexandrinus nivosis*). Additionally, the adjacent wetlands support one threatened plant species, the marsh gum plant (*Grindelia humilis*).[1]

The primary commercial fishing conducted in the South San Francisco Bay is for fishing bait such as shrimp and small fish. Some commercial herring fishing is conducted in the south bay north of San Mateo Bridge and south of Hunters Point and the Alameda Naval Air Station. The South Bay is also used for recreational clamming along the mud flats on the western side of the bay.[1]

6.0 SOLID WASTE MANAGEMENT AND AREAS OF CONCERN

All SWMUs and AOCs identified during the file review are listed by building location in Table 7. A more detailed discussion of these units, also organized by building, is provided in Sections 6.2-6.40, and is cross referenced in column one of Table 7. As shown below, plating areas, spray paint booths, and degreasing operations are ubiquitous at the Lockheed facility. Because the wastes associated with each of these three operations differs little regardless of the location of the operation, a generic write-up is provided for plating areas, spray paint booths, and degreasers in Section 6.1. A map depicting the location of all identified SWMUs is shown in Figure 7.

In several cases, little or no information was available about operations and waste management practices in the buildings. Additional information about the activities in these buildings will be requested during the VSI.

Table 7: SWMUs and AOCs by Building Location

Report Section	Building No.	Identified SWMUs/AOCs
Not applicable (NA)	11C	No SWMUs or AOCs identified
6.2	14E/041	SWMU 14E/041-1: Spray Paint Booths (3) SWMU 14E/041-2: Building 14E Former Hazardous Waste Container Storage Facility SWMU 14E/041-3: Solvent Recovery System AOC 14E-1: Waste Oil Sump/Underground Waste Oil Tank
6.3	071	SWMU 071-1: Plating Area (1) SWMU 071-2: Spray Paint Booths (4) AOC 071-1: Solvent Cleaning Operations (5) AOC 071-2: Solvent Storage Tanks/USTs (2)
6.4	076	SWMU 076-1: Spray Paint Booth (1) SWMU 076-2: Degreaser (1)
NA	101	No SWMUs or AOCs identified
6.5	102	SWMU 102-1: Sanitary Wastewater Collection System

Report Section	Building No.	Identified SWMUs/AOCs
6.6	103	SWMU 103-1: Plating Area (1) SWMU 103-2: Degreasers (4) SWMU 103-3: Plating Waste Tanks (WT103-2) (WT103-3) (WT103-4)
6.7	104	AOC 104-1: Soil Contamination Area 1 AOC 104-2: Soil Contamination Area 2
NA	105	No SWMUs or AOCs identified
NA	106	No SWMUs or AOCs identified
NA	107	No SWMUs or AOCs identified
6.8	109	AOC 109-1: USTs (4)
NA	110	No SWMUs or AOCs identified
NA	111	No SWMUs or AOCs identified
NA	112	No SWMUs or AOCs identified
6.9	113	SWMU 113-1: Degreasers (4) SWMU 113-2: Neutralization Unit
6.10	114	SWMU 114-1: Andco Treatment Unit SWMU 114-2: Clarifier/Sludge Thickening Unit/Filter Press SWMU 114-3: Former HMPU SWMU 114-4: Former Cyanide Destruction Unit SWMU 114-5: Hazardous Waste Container Storage Area
NA	119	No SWMUs or AOCs identified
NA	123	No SWMUs or AOCs identified
NA	125	No SWMUs or AOCs identified
NA	128	No SWMUs or AOCs identified
NA	129	No SWMUs or AOCs identified
6.11	130	SWMU 130-1: Degreaser (1)
6.12	132	SWMU 132-1: Solvent Waste Drum
NA	133	No SWMUs or AOCs identified
NA	134	No SWMUs or AOCs identified

Report Section	Building No.	Identified SWMUs/AOCs
6.13	136	SWMU 136-1: Spray Paint Booth (1)
6.14	138	SWMU 138-1: Vehicle Maintenance Facility
NA	139	No SWMUs or AOCs identified
6.15	140	SWMU 140-1: Spray Paint Booth (1)
6.16	141	SWMU 141-1: Spray Paint Booth (1)
6.17	142	SWMU 142-1: Sanitary Sewer Catch Basin
NA	143	No SWMUs or AOCs identified
NA	145	No SWMUs or AOCs identified
NA	146	No SWMUs or AOCs identified
NA	147	No SWMUs or AOCs identified
NA	149	No SWMUs or AOCs identified
6.18	150	SWMU 150-1: Plating Area (1) SWMU 150-2: Spray Paint Booth (1) SWMU 150-3: Degreaser (1)
NA	150A	No SWMUs or AOCs identified
6.19	151	SWMU 151-1: Plating Area (1) SWMU 151-2: Spray Paint Booths (7) SWMU 151-3: Degreasers (11) SWMU 151-4: Methylene Chloride Still SWMU 151-5: Waste Chemical Storage Area SWMU 151-6: Former Waste Diversion System SWMU 151-7: Former Copper Pretreatment Facility
6.20	152	SWMU 152-1: Spray Paint Booths (2) SWMU 152-2: Hoist Sump
6.21	153	SWMU 153-1: Plating Area (1) SWMU 153-2: Spray Paint Booths (5) SWMU 153-3: Degreasers (7)
6.22	153A	SWMU 153A-1: Spray Paint Booth (1)
NA	154	No SWMUs or AOCs identified
6.23	155	SWMU 155-1: Spray Paint Booth (1)

Report Section	Building No.	Identified SWMUs/AOCs
NA	156	No SWMUs or AOCs identified
NA	157	No SWMUs or AOCs identified
NA	158	No SWMUs or AOCs identified
6.24	159	SWMU 159-1: Spray Paint Booth (1)
6.25	159C	SWMU 159C-1: Spray Paint Booth (1)
NA	160	No SWMUs or AOCs identified
NA	161	No SWMUs or AOCs identified
NA	162	No SWMUs or AOCs identified
NA	164	No SWMUs or AOCs identified
NA	165	No SWMUs or AOCs identified
6.26	166	SWMU 166-1: Former Automotive Service Station
NA	168	No SWMUs or AOCs identified
6.27	170	SWMU 170-1: Plating Area (1) SWMU 170-2: Spray Paint Booths (4) SWMU 170-3: Degreasers (2) SWMU 170-4: Waste Beryllium Tank SWMU 170-5: Baghouse Dust Area SWMU 170-6: Process Clarifiers (2) and Underground Sumps (4) SWMU 170-7: Storm Ditch 002 SWMU 170-8: Waste Machinery Oil Tank
6.28	171	SWMU 171-1: Incinerator
NA	172	No SWMUs or AOCs identified
NA	173	No SWMUs or AOCs identified
6.29	174	SWMU 174-1: Spray Paint Booths (6)
NA	175	No SWMUs or AOCs identified
NA	177	No SWMUs or AOCs identified
NA	178	No SWMUs or AOCs identified
6.30	179	SWMU 179-1: Metal Wastewater Sump SWMU 179-2: Former Cyanide Destruction Unit

Report Section	Building No.	Identified SWMUs/AOCs
NA	180	No SWMUs or AOCs identified
	181	SWMU 181-1: Spray Paint Booth (1) SWMU 181-2: Silver Retention Sump
6.31	182	SWMU 182-1: Plating Area (1) SWMU 182-2: Spray Paint Booths (8) SWMU 182-3: Degreasers (5) SWMU 182-4: Plating Waste Tank SWMU 182-5: Former Air Scrubbers SWMU 182-6: Former Floor Grating SWMU 182-7: Former Boiler Room Sump SWMU 182-8: Former Wastewater USTs (3) SWMU 182-9: Acid Retention Sump SWMU 182-10: Metal Process Waste Sumps (3) SWMU 182-11: Waste UST
6.32	183	SWMU 183-1: Degreaser (1)
NA	184	No SWMUs or AOCs identified
NA	185	No SWMUs or AOCs identified
6.33	186	AOC 186-1: Leaded Gas UST
6.34	187	SWMU 187-1: Waste Coolant Oil UST
6.35	188	SWMU 188-1: Spray Booth(1)
NA	189	No SWMUs or AOCs identified
NA	190	No SWMUs or AOCs identified
NA	191	No SWMUs or AOCs identified
NA	194	No SWMUs or AOCs identified
NA	195A	No SWMUs or AOCs identified
6.36	195B	SWMU 195B-1: Spray Booth (1) SWMU 195B-2: Degreaser (1)
NA	195D	No SWMUs or AOCs identified
NA	196	No SWMUs or AOCs identified
NA	528	No SWMUs or AOCs identified

Report Section	Building No.	Identified SWMUs/AOCs
NA	560	No SWMUs or AOCs identified
NA	561	No SWMUs or AOCs identified
6.36	562	SWMU 562-1: Degreaser (1) SWMU 562-2: Wastewater Treatment System
NA	563	No SWMUs or AOCs identified
NA	564	No SWMUs or AOCs identified
NA	565	No SWMUs or AOCs identified
NA	566	No SWMUs or AOCs identified
NA	567	No SWMUs or AOCs identified
NA	571	No SWMUs or AOCs identified
NA	572	No SWMUs or AOCs identified
NA	573	No SWMUs or AOCs identified
NA	574	No SWMUs or AOCs identified
NA	575	No SWMUs or AOCs identified
NA	583	No SWMUs or AOCs identified
NA	588	No SWMUs or AOCs identified
NA	1001	No SWMUs or AOCs identified
NA	1002	No SWMUs or AOCs identified
NA	1004	No SWMUs or AOCs identified
NA	1005	No SWMUs or AOCs identified
NA	1006	No SWMUs or AOCs identified
NA	1007	No SWMUs or AOCs identified
NA	1008	No SWMUs or AOCs identified
NA	1009	No SWMUs or AOCs identified
NA	1010	No SWMUs or AOCs identified
NA	1013	No SWMUs or AOCs identified

Report Section	Building No.	Identified SWMUs/AOCs
NA	1016	No SWMUs or AOCs identified
NA	1018	No SWMUs or AOCs identified
NA	1023	No SWMUs or AOCs identified
NA	1024	No SWMUs or AOCs identified
NA	001 US Air Force	No SWMUs or AOCs identified
6.39	Surface Impound-ment Cluster	SWMU Surface Impoundment Cluster-1: Evaporation Ponds SWMU Surface Impoundment Cluster-2: Holding Ponds
6.40	Storm Ditch 001	AOC 001-1: Storm Ditch 001

6.1 Plating Areas, Spray Paint Booths, and Degreasing Units

Plating areas, spray paint booths, and degreasing operations are ubiquitous throughout the Lockheed facility, and in many cases occur at several areas within the same building. Regardless of the location of the activity, the wastes associated with these units vary little; thus, a generic write-up is provided for plating areas, spray paint booths, and degreasers. These write-ups are referenced in each building section where these operations occur. The number of plating areas, booths, or degreasing units is indicated in parentheses following the SWMU name (e.g., Spray Paint Booths (3)).

6.1.1 Plating Operations

Unit Description

Plating areas were identified at nine locations at the facility in Buildings 071, 103, 150, 151, 153, 170, and 182. These operations include both electroplating and electroless plating with common and precious metals.[1, 2]

Wastes Managed

Wastewaters from these operations are typically acidic and contain concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc.[2] Wastes from most of the plating facilities are piped directly to the Central Wastewater Treatment Plant (CWTP) for treatment before being discharged to the evaporation or holding ponds and eventually to the POTW. A portion of the plating wastewater is directly discharged to the evaporation ponds. Past waste handling practices are unclear from the file review. Additional information will be requested during the VSI.[1, 2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.1.2 Former and Current Spray Paint Booths

Unit Description

In 1990, there were a total of 50 spray paint booth locations in 19 buildings. Many of these booths are no longer in operation. It is unclear what types of paints have been

used in these booths, although one type of paint booth uses water curtain to entrain pigments.[1,2] Additional information on these units will be requested during the VSI.

Wastes Managed

Wastewater from the units may be discharged directly to the POTW. Information regarding solvents used at these booths and paint wastes will be requested during the VSI.[1,2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.1.3 Degreasers

Unit Description

Degreasing units have been operated at various locations throughout the site. Solvents used include TCA, Freon, and other solvents. In 1990, a total of 39 degreaser units were identified.[1] Specific information about the degreasers will be requested during the VSI.

Wastes Managed

Information on solvents used at these degreasing sites will be requested during the VSI. Little information was found in file material about historical waste practices from these degreasing units.[2]

Release Controls

Information on these unit will be requested during the VSI.

History of Release

Information on these units will be requested during the VSI.

Remedial Actions

Information on these units will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.2 BUILDING 14E/041

6.2.1 SWMU 14E/041-1: Spray Paint Booths (3)

Three spray paint booths were identified at the site as of 1990. (See discussion of Spray Paint Booths in Section 6.1.2.[1])

6.2.2 SWMU 14E/041-2: Building 14E Former Hazardous Waste Container Storage Area

Unit Description

The 14E area was a two-acre, paved hazardous waste storage area that was used to store hazardous and recyclable materials from 1959 until 1986.[2] The wastes were stored in five to 55-gallon drums, or metal bins. Lockheed's original Part A application indicates that 36,585 gallons of hazardous waste were managed in the container storage area annually.[59, 61]

Wastes Managed

Solvents, ammonium hydroxide, sodium chlorate, sodium hydroxide, sodium chlorite, formaldehyde, silver solutions, potassium ferricyanide, zinc, cadmium, chromium, copper, acids, oils, and magnesium metal turnings are among the types of waste handled in this unit.[2] Lockheed's original Part A application indicates that 36,585 gallons of hazardous waste were managed in the container storage area annually.[59, 61]

Release Controls

The area was paved the entire time it was in use as a hazardous waste storage area.[2]

History of Release

TCE and trans-1,2-DCE were detected in shallow soil at 6.2 mg/kg and 2.5 mg/kg, respectively.[2] Additional information about the location of the release will be determined in the VSI.

Remedial Actions

Soil was excavated from three areas in the vicinity of 14E.[2] Additional information about the location of the excavations will be determined in the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.2.3 SWMU 14E/041-3: Solvent Recovery System

Unit Description

No information about this unit was found in file material. A description of the unit will be requested during the VSI.

Wastes Managed

No information regarding specific solvent(s) recovered in this unit was found in file material. This information will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.2.4 AOC 14E-1: Waste Oil Sump/Underground Waste Oil Tank

Waste oil was stored in a 2,000-gallon UST at 14E. The tank was removed in 1986.[2] Additional information about sampling and excavation will be requested in the VSI.

6.3 BUILDING 071

6.3.1 SWMU 071-1: Plating Areas (1)

In 1990, one plating area was identified in Building 071. (See discussion of Plating Areas in Section 6.1.1.[1])

6.3.2 SWMU 071-2: Spray Paint Booths (4)

Four spray paint booths were identified in Building 071 as of 1990. (See discussion of Spray Paint Booths in Section 6.1.2.[1])

6.3.3 AOC 071-3: Solvent Cleaning Operations (5)

Five solvent cleaning operations were documented in Building 071. Soil sampling conducted in this area has indicated chromium and lead contamination. The source of the contamination is unclear. Contaminated soil was excavated. It is unclear what confirmation sampling was performed.[2] Information about the activities and chemicals used will be requested during the VSI.

6.3.4 AOC 071-4: Solvent Storage Tanks/Underground Storage Tanks (2)

Information about the capacity and types of solvents stored in this tank will be requested during the VSI.[2]

6.4 BUILDING 076

6.4.1 SWMU 076-1: Spray Paint Booths (1)

One spray paint booth was identified in Building 076 as of 1990. (See discussion of Spray Paint Booths in Section 6.1.2.[1])

6.4.2 SWMU 076-2: Degreasers (1)

See discussion of Degreasers in Section 6.1.3.[1]

6.5 BUILDING 102

6.5.1 SWMU 102-1: Sanitary Wastewater Collection System

Unit Description

No information about this unit was found in file material. This information will be requested during the VSI.

Wastes Managed

Information about wastes managed in this unit will be requested during the VSI.

Release Controls

Information about release controls associated with this unit will be requested during the VSI.

History of Release

On October 17, 1989 as a result of an earthquake, a microfilm processor that contained 36 gallons of photographic solution fell over. Approximately 18 gallons of this solution was released to the sanitary sewer. Lockheed estimated that a total of 0.5 pounds of chromium was released to the sanitary sewer.[83]

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.6 BUILDING 103

6.6.1 SWMU 103-1: Plating Areas (1)

See discussion of Plating Areas in Section 6.1.1.[1]

The unit managed plating wastes. Chromium was used in the plating solutions.[83] As a result of the earthquake in October 1989, approximately 11,300 gallons of process solutions and rinsewaters spilled out of the plating systems and onto to the floors of the plating areas. The solutions were held within the building, and Lockheed reported that no release to soil occurred. Information about the disposition of the 11,300 gallons will be requested during the VSI.[83] The chromium plating solution was removed. Details on the cleanup will be requested during the VSI.[83]

6.6.2 SWMU 103-2: Degreasers (4)

See discussion of Degreasers in Section 6.1.3.[1]

6.6.3 SWMU 103-3: Plating Waste Tanks (WT103-2) (WT103-3) (WT103-4)

Unit Description

Tank 103-2 is located on the west side of Building 103.[85] Additional information about these tanks will be requested during the VSI.

Wastes Managed

The tanks are used to manage plating wastes. Chromium was used in the plating solutions.[84] Additional information will be requested during the VSI.

Release Controls

Tank 103-2 has secondary containment.[85] Additional information on the unit will be requested during the VSI.

History of Release

On July 20, 1988, approximately 1,500 gallons of chromium-containing wastewater were discharged from Tank 103-2 to an abandoned sanitary line. Lockheed estimated that approximately 4.4 pounds of chrome were discharged.[84] Additional information will be requested during the VSI.

On November 23, 1988, as the tank was to be emptied, the hosing coupling failed, and the contents of the tank flowed into the tanks secondary containment system. Approximately 200 gallons splashed out of the secondary containment onto the surrounding asphalt.[85]

On January 3, 1990, a waste transfer line from Tank 103-4 was accidently hit, and two gallons of waste liquid were released to the pavement. The waste liquid was cleaned up and placed into Tank 103-3.[86]

On April 11, 1990, Tank 103-2 overflowed into the secondary containment.[87]

Remedial Actions

Additional information will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.7 BUILDING 104

6.7.1 AOC 104-01: Soil Contamination Area 1

During demolition of a concrete slab in Building 104 in early 2000, chemical odors were noted. Surface soil sampling was conducted, and biphenyl (21.0 mg/kg) and diphenyl ether were detected.[88] Additional soil sampling was conducted, resulting in the removal of 225 cubic yards of soil. Confirmation samples collected from the bottom of

the excavation all contained less than 350 mg/kg of biphenyl and diphenyl ether.[88] Additional information will be requested during the VSI. See Figure 8 for the location of this AOC.

6.7.2 AOC 104-2: Soil Contamination Area 2

During excavation activities in Building 104 in early 2000, chemical odors were noted, and four cubic yards of soil were excavated. The soil was analyzed and found to contain Stoddard solvent and 1,3,5-trimethylbenzene. A concrete structure was removed along with additional soil. Additional sampling and excavation resulted in the removal of 90 cubic yards of soil. Confirmation samples, collected through backfill in the excavated area using Geoprobes, did not contain detectable levels of Stoddard solvent or 1,3,5-trimethylbenzene.[88] See Figure 8 for the location of this AOC. Additional information will be requested during the VSI.

6.8 BUILDING 109

6.8.1 AOC 109-1: USTs (4)

There were four 10,000-gallon USTs at the service station associated with Building 109. Three of the tanks held regular, unleaded gasoline and the forth tank held diesel. Groundwater monitoring wells were installed in 1985, and samples collected in August 1988 contained benzene and total petroleum hydrocarbons. Integrity testing performed in September 1988 indicated that two of the gas tanks and the diesel tank had failed. In January 1989 all four tanks were removed.[13]

During tank removal, soil contamination was noted. Soil and groundwater sampling was conducted. Additional excavation and sampling was proposed in 1990.[13] The extent of soil contamination had not been determined, but groundwater was consistently found to not be contaminated. Additional information will be requested during the VSI.

6.9 BUILDING 113

6.9.1 SWMU 113-1 Degreasers (4)

In 1990 four degreasers were identified in Building 113. (See discussion of Degreasers in Section 6.1.3.[1])

6.9.2 SWMU 113-2 Neutralization Unit

Unit Description

This formerly-operated three-staged unit utilized sulfuric or hydrofluoric acid for neutralization. The unit is constructed of concrete and is surrounded by a berm. Following neutralization, the waste, which was generated from printed circuit board manufacturing, was discharged directly to the city sewer.[2] The disposition pathway for these wastes prior to, during, and after, the evaporation ponds were operated is not clear from the available material. It is also unclear which buildings generate printed circuit board manufacturing wastes.[2] This information will be requested during the VSI.

Wastes Managed

The unit managed wastewater from circuit board operations.[2] Additional information on the unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Closure and post-closure information has been submitted to the City of Sunnyvale and the California Department of Toxic Substances Control (DTSC). Closure was granted by DTSC on May 14, 1996.[2] Additional information will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.10 BUILDING 114

6.10.1 SWMU 114-1: Former Andco Treatment Unit

Unit Description

The formerly-operated Andco treatment unit was the first stage of pre-treatment for rinsewaters, wastewaters, and other process-related solutions generated in operations in Buildings 071, 103, 150, 151, 159, 170, and 182. Pre-treatment activities included: 1) neutralization of liquid corrosive metals, and 2) electrochemical reduction of hexavalent chromium to trivalent chromium.[1,2] The unit was designed to process 50 gallons of liquids per minute in a batch mode, or 10,000 to 30,000 gallons per week, and treatment processes generated a stable metal hydroxide sludge in the amount of 0.25 cubic yards per month.[9]

Transfer pipelines from Buildings 071, 103, 150, 151, 159, 170, and 182 transferred waste to the unit.[7,20,38] Two 18,000-gallon aboveground storage tanks (ASTs) contained bulk raw material (caustic soda and sulfuric acid) used for pH adjustment, and there was one feed tank for pH adjustment.[1,2]

After neutralization and chromium reduction in the Andco unit, the wastewater from the unit was routed to the clarifier/sludge thickening tank/filter press (SWMU 114-2). Sludges generated from the Andco treatment unit were transferred to a less than 90-day container storage area.[1,2]

The Andco unit began operation in 1986, and DHS granted a treatment variance for the unit in June 19, 1990. DTSC granted closure to the facility on May 14, 1996.[2]

Wastes Managed

The Andco Treatment Unit pre-treated the following waste streams:

- Metal bearing wastewater streams
- Acidic or alkaline wastes not containing metals
- Metal-bearing sludge produced through treatment of wastewaters
- Spent or off-specification process solutions
- Small quantities of laboratory waste
- Small quantities of periodic maintenance wastes.[38]

Etching chemical milling and plating wastes accounted for the majority of waste. Title 40 waste codes handled in the course of the wastewater treatment train included:

- D002 (corrosive)
- D006 (toxic for cadmium content)
- D007 (toxic for chromium content)
- D008 (toxic for lead content)
- D011 (toxic for silver content)
- F006, F007, F008, F009, F012, F019 (electroplating wastes).[38]

The DHS 8022A Uniform Hazardous Waste Numbers for the wastes handled are: 121, 122, 131, 132, 171, 541, 711, 722, 723, 726, 791, and 792.[38] Additional information about the waste streams that were treated at the Andco unit will be requested during the VSI.

Release Controls

Building 114 is sloped and diked to contain any spilled liquids and prevent runon from outside the facility. Accumulated liquids were pumped to the waste storage tanks. The containment area has adequate capacity to contain liquids if tank failure occurs.[38]

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.10.2 SWMU 114-2: Former Clarifier/Sludge Thickening Unit/Filter Press

Unit Description

This unit is comprised of three tanks: the Clarifying Tank, the Thickening Tank, and the Filter Press. The capacity and material of construction of the tanks will be verified during the VSI.[2]

The Clarifier/Sludge Thickening Unit/Filter Press unit accepted pre-treated wastewater from the Andco tank for separation of insoluble precipitates. The underflow from the clarifier, which contained insoluble precipitate, was pumped to the Thickening Tank where insolubles were further precipitated. Underflow from the Thickening Tank was then pumped to a filter press where the final solids separation and concentration occurred.[38, 2]

The resulting filter cake of insoluble metal hydroxides was placed into lined drums. Effluent water from the unit was discharged to the equalization ponds. Operation of this unit began in 1986, and the unit was closed in 1996.[2]

Wastes Managed

The Clarifier/Filter Press unit managed pre-treated wastewater from Andco (SWMU 114-1) and HMPU (SWMU 114-3) for precipitation of solids, primarily metals. The Thickening Tank handled an alkaline metal hydroxide sludge.[2, 38]

Release Controls

Building 114 is sloped and diked to contain any spilled liquids and prevent run-on from outside the facility. The treatment unit was situated on steel-reinforced concrete, and the area was bermed with epoxy-coated concrete.[2]

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.10.3 SWMU 114-3 Former Hazardous Materials Processing Unit

Unit Description

The HMPU operated from October 1990 until March 1996. The unit consisted of three polyethylene 13,000-gallon ASTs. The unit also contained a 6,000-gallon aboveground primary reactor tank where hazardous waste underwent chemical reduction and pH adjustment. This unit was closed in March 1996 and dismantled.[2]

Wastes Managed

The unit was designed to treat plating waste, acidic and alkaline wastes, and spent or out-of specification process solutions.[2]

Release Controls

Building 114 is sloped and diked to contain any spilled liquids and prevent run-on from outside the facility. The treatment unit is situated on steel-reinforced concrete and the area was bermed with epoxy-coated concrete.[2, 38]

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.10.4 SWMU 114-4: Former Cyanide Destruction Unit

Unit Description

This unit was located on the east side of Building 114. It was intended to treat cyanide wastes generated from chemical processing operations, but was operated only once in 1990 to treat nonhazardous wastewater. This unit was decontaminated and closed in place in March of 1996.[2]

Wastes Managed

Information on the wastes handled during the system test will be requested during the VSI. Waste used for the system test was not hazardous, but the quantity and types of waste are unclear.[2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.10.5 SWMU 114-5: Hazardous Waste Container Storage Area

Unit Description

This unit has been used from 1986 until the present day to store hazardous wastes generated at the facility.[2] A detailed description of this unit will be requested during the VSI.

Wastes Managed

Information on the wastes handled in the area will be requested during the VSI. File material suggests that a significant amount of wastewater treatment sludge is stored in this area.[2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the release potential will be determined during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.11 BUILDING 130

6.11.1 SWMU 130-1: Degreaser (1)

See discussion of Degreasers in Section 6.1.3.[1]

6.12 BUILDING 132

6.12.1 SWMU 132-1: Solvent Waste Drums

Unit Description

Potential soil contamination was investigated related to a berm that was previously located around Building 132. Limited information was found regarding the location of the waste solvent drums thought to be a potential source of the contamination; however, Building 168 was also referenced in conjunction with these waste drums. Additional information will be requested about this potential contaminant source during the VSI.[2]

Wastes Managed

Spent solvents (potential waste codes: F001-F005) may have been managed at this unit.[2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Petroleum hydrocarbons were detected at a concentration of 680 mg/kg at a depth of six inches bgs, and at less than 100 mg/kg at a depth of three feet bgs. Lead concentrations from hand auger and soil borings were measured at 120 mg/kg.[2] Additional information on the unit will be requested during the VSI.

Remedial Actions

No known remediation activities associated with this unit have been performed.[2]

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.13 BUILDING 136

6.13.1 SWMU 136-1: Spray Paint Booth (1)

The quantity of spray paint booths in Building 136 will be verified during the VSI, as the file material is somewhat unclear. (See discussion of Spray Paint Booths in Section 6.1.2.)

6.14 BUILDING 138

SWMU 138-1: Former Steam Cleaning Unit

Unit Description

The former steam cleaning unit was located in the Vehicle Maintenance Facility in Building 138.[2]

Wastes Managed

The former steam cleaning unit was considered a potential source of grease, oil, and degreasing solvents.[2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Hydrocarbon contamination at a concentration of 2,000 mg/kg was detected in a soil sample taken at a depth of 1.5 feet bgs. Acetone was detected at a concentration of 10 mg/kg in soil samples and borings taken at eight and ten feet bgs. The acetone contamination was not detected in a replicate sample at this location; thus, the acetone was considered a laboratory contaminant.[2]

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.15 BUILDING 140

6.15.1 SWMU 140-1: Spray Paint Booths (1)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.16 BUILDING 141

6.16.1 SWMU 141-1: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.17 BUILDING 142

6.17.1 SWMU 142-1: Sanitary Sewer Catch Basin

Unit Description

Building 142 contains bench-scale chemistry laboratories. Limited file information indicates that the building has a sanitary sewer catch basin. Additional information about this catch basin will be requested during the VSI.

Wastes Managed

Information about wastes handled in the laboratory will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.18 BUILDING 150

6.18.1 SWMU 150-1 Plating Area (1)

See discussion of a Plating Area in Section 6.1.1.[1]

6.18.2 SWMU 150-2 Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.18.3 SWMU 150-3 Degreaser (1)

See discussion of a Degreaser in Section 6.1.3.[1]

6.19 BUILDING 151

6.19.1 SWMU 151-1 Plating Area (1)

See Figure 9 for a depiction of the layout and sampling locations at Building 151.[90] (See discussion of a Plating Area in Section 6.1.1.[1])

6.19.2 SWMU 151-2 Spray Paint Booth (7)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.19.3 SWMU 151-3 Degreasers (11)

See discussion of Degreasers in Section 6.1.3.[1]

6.19.4 SWMU 151-4: Methylene Chloride Still

Unit Description

The methylene chloride still was located in Building151.[22] Additional information on the unit will be requested during the VSI.

Wastes Managed

The unit apparently managed spent methylene chloride.[90]

Release Controls

The unit was located within Building 151.[90] Additional information about release controls associated with the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.19.5 SWMU 151-5: Waste Chemical Storage Area

Unit Description

The unit was located within Building 151.[22] It is unclear whether the area is still in operation. Additional information on the unit will be requested during the VSI.

Wastes Managed

A diagram of the building indicates that approximately 150 drums of waste could be managed in the unit.[90] Additional information on the unit will be requested during the VSI.

Release Controls

The unit was located inside Building 151.[22] Additional information on the unit will be requested during the VSI.

History of Release

Soil samples collected in the vicinity of the unit contained concentrations of TCA up to 3,000 ppb. Methylene chloride, acetone, 1,1-DCA, 1,1-DCE, trans-1,2-DCE, chloroform, 1,2-DCA, PCA, TCE, and PCE were also detected.[22]

Remedial Actions

The unit has been dismantled. Approximately 450 cubic yards of soil have been removed in the vicinity of this unit.[22]

Soil/Groundwater Release Potential

There has been a release to soil and groundwater from the unit.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI

6.19.6 SWMU 151-6: Former Waste Diversion System

Unit Description

This unit was formerly located on the north side of Building 151. It was removed in the late 1980s or early 1990.[22] Additional information on the unit will be requested during the VSI.

Wastes Managed

Information on the unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Soil samples collected in the vicinity of the unit contained concentrations of TCA up to 3,000 ppb. Methylene chloride, acetone, 1,1-DCA, 1,1-DCE, trans-1,2-DCE, chloroform, 1,2-DCA, PCA, TCE, and PCE were also detected.

Remedial Actions

The unit has been dismantled. Approximately 450 cubic yards of soil have been removed in the vicinity of this unit.[22]

Soil/Groundwater Release Potential

There has been a release to soil and groundwater from the unit.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI

6.19.7 SWMU 151-7: Former Copper Pretreatment Facility

Unit Description

The unit was formerly located on the north side of Building 151. It was removed in the late 1980s or early 1990s.[22] Additional information on the unit will be requested during the VSI. See Figure 9 for a depiction of the layout and sampling locations at Building 151.

Wastes Managed

Information on the unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Soil samples collected in the vicinity of the unit contained concentrations of TCA up to 3,000 ppb. Methylene chloride, acetone, 1,1-DCA, 1,1-DCE, trans-1,2-DCE, chloroform, 1,2-DCA, PCA, TCE, and PCE were also detected.

Remedial Actions

The unit has been dismantled. Approximately 450 cubic yards of soil have been removed in the vicinity of this unit.[22]

Soil/Groundwater Release Potential

There has been a release to soil and groundwater from the unit.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.20 BUILDING 152

6.20.1 SWMU 152-1 Spray Paint Booth (2)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.20.2 SWMU 152-2: Hoist Sump

Unit Description

The unit is located in the southeast portion of Building 152. The unit is approximately five feet below grade. A replacement for the hoist was installed in early 1989.[91] Additional information will be requested during the VSI.

Wastes Managed

The unit manages discharges from the hydraulic hoist.[91] Additional information will be requested during the VSI.

Release Controls

The sump serves as a release control for hydraulic equipment. Additional information on the unit will be requested during the VSI.

History of Release

In January 1980, soil and groundwater sampling was performed. Soil samples contained a maximum of 28,400 ppm oil and grease, and the groundwater contained 48,400 ppm oil and grease.[91]

Remedial Actions

Additional information will be requested during the VSI.

Soil/Groundwater Release Potential

A release from the unit has impacted soil and groundwater.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.21 BUILDING 153

6.21.1 SWMU 153-1 Plating Area (1)

See discussion of a Plating Area in Section 6.1.1.[1]

6.21.2 SWMU 153-2 Spray Paint Booth (5)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.21.3 SWMU 153-3 Degreaser (7)

See discussion of Degreasers in Section 6.1.3.[1]

6.22 BUILDING 153A

6.22.1 SWMU 153A-1 Spray Paint Booth (1)

See discussion of a Spray Paint Booth in Section 6.1.2.[1]

6.23 BUILDING 155

6.23.1 SWMU 155-1 Spray Paint Booth (1)

See discussion of a Spray Paint Booth in Section 6.1.2.[1]

6.24 BUILDING 159

6.24.1 SWMU 159-1 Spray Paint Booth (1)

See discussion of a Spray Paint Booth in Section 6.1.2.[1]

6.24.2 AOC 159-1: Underground Tanks and Sumps (2)

Two underground tanks storing corrosive solutions from metals processing operations have been have been used intermittently over the past 20 years. A monitoring well was installed near one of the tanks in 1987. TCE at a concentration of 0.076 mg/l and TCA at

a concentration of 0.012 mg/l were detected in groundwater samples. File information is limited but suggests that the contamination source is located upgradient of the monitoring well. Additional information about potential sources of this VOC contamination will be requested during the VSI.

6.25 BUILDING 159C

6.25.1 SWMU 159C-1 Spray Paint Booth (1)

See discussion of a Spray Paint Booth in Section 6.1.2.[1]

6.26 BUILDING 166

6.26.1 SWMU 166-1: Former Automotive Service Station

Unit Description

This former automotive service station existed in what is now the parking lot to Building 166. It is unclear during what years or for how long the service station operated.[2]

Wastes Managed

Information on the wastes managed in this unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.[2]

History of Release

Three soil borings were completed in the former location of the service station. Total petroleum hydrocarbons were measured at 790 mg/kg. Groundwater samples taken in 1987 from downgradient monitoring well 151-5 contained benzene at less than 0.5 µg/l.[2]

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.27 BUILDING 170

6.27.1 SWMU 170-1 Plating Area (1)

This plating area includes two underground waste plating solution or rinsewater tanks which hold 4,000 and 5,000 gallons, respectively. (See discussion of a Plating Area in Section 6.1.1.[1])

6.27.2 SWMU 170-2 Spray Paint Booth (4)

Information regarding the number of spray paint booths in Building 170 will be verified during the VSI, as information from file sources is unclear. (See discussion of Spray Paint Booths in Section 6.1.2.[1])

6.27.3 SWMU 170-3 Degreasers (2)

See discussion of Degreasers in Section 6.1.3.[1]

6.27.4 SWMU 170-4: Waste Beryllium Tank

Unit Description

Lockheed stores 7,500 gallons of beryllium waste in an underground waste tank (WT 170-5).[2, 52]

Wastes Managed

Beryllium wastes are managed in this unit.[2, 52]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.27.5 SWMU 170-5: Baghouse Dust Area

Unit Description

Information about activities that occur in the Baghouse Area will be requested during the VSI.

Wastes Managed

Beryllium wastes are managed in this unit.[2, 52]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

One-third of a pound of beryllium in the form of metal turnings and particulate debris was released on the west side of Building 170 at the baghouse dust collection area.[2]

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.27.6 SWMU 170-6: Process Clarifiers (2) and Underground Sumps (4)

Unit Description

Two large underground process clarifiers are located on the east side of Building 170. Four 10,000-gallon underground sumps are located in between the two clarifiers. The sumps and clarifiers were operational from at least 1969 until 1998.[2] The size of these units will be established during the VSI.

Wastes Managed

Sodium chloride and sodium nitrate have been managed in this unit.[2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

In 1969, Lockheed installed five wells to determine the extent of clarifier solution contamination. Nitrate contamination was detected in groundwater. No information

about levels of contamination or other contaminants was found in file material. File information indicates that Lockheed also sampled for beryllium and titanium from 1969 to 1972.[2]

Between 1986 and 1987, groundwater data from monitoring wells downgradient from Building 170 indicated that VOCs and nitrates were present above maximum contaminant levels (MCLs). Contaminants detected included TCA at 66 µg/l, TCE at 567 µg/l, PCE at 48 µg/l, and nitrate at 346 mg/l.[2]

Remedial Actions

The clarifying units were withdrawn from service, cleaned, relined with plastic sealant, and reinforced with fiberglass following indications that clarifying solution was causing contamination. It is unclear when the clarifiers were removed from service.[2]

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.27.7 SWMU 170-7: Storm Ditch 002

Unit Description

Storm Ditch 002 is located approximately 50 feet north northeast of Building 170. Surface drainage from the asphalt surface on the northeast side of Building 170 historically collected in a low area and was periodically released into Storm Ditch 002. During the VSI, additional information will be requested to verify the disposition of storm ditch discharge. It appears that the ditch flows into the wetlands on the north side of the site adjacent to the waste water equalization ponds. These wetlands flow into the Lockheed Channel which runs along the northern boundary of the site. The channel water is then regulated by the Lockheed Pump State located approximately 1,500 feet from the northeastern boundary of the site, and is adjacent to the City of Sunnyvale Landfill. (See Figure 2). Ultimately, water from the channel is pumped to the

Guadalupe Slough at the southern boundary of San Francisco Bay.[1, 24] Sunnyvale granted clean closure to the Building 170 and the Storm Ditch 002 area on July 27, 1999.

Wastes Managed

Information about the wastes managed in Stormwater Ditch 002 will be requested during the VSI.

Release Controls

information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Contamination at Storm Ditch 002 was characterized from 1987 to 1988, and contaminated soil was removed in 1987, 1988, and 1990, 1998, 1998.[2] In 1987, beryllium concentrations exceeding the TTLC limit were measured in three samples with concentrations of 200 mg/kg, 80 mg/kg, and 500 mg/kg, respectively. Fourteen cubic yards of soil were excavated, confirmation sampling was completed, and additional soil was excavated twice in 1988. Hydrocarbon contamination at 460 mg/kg was detected at a depth of four inches bgs later in 1988. Metal concentrations were also detected for lead, cadmium, and zinc at concentrations of 350 mg/kg, 4.2 mg/kg, and 460 mg/kg, respectively. Additional soil was excavated. In 1990, soil samples detected additional beryllium contamination ranging from 0.46 to 1.9 mg/l. Approximately 968 tons of soil were removed and disposed in 1998. Confirmation sampling indicates that beryllium concentrations were below STLC, and TPH was below 100 mg/kg.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.27.8 SWMU 170-8: Waste Machinery Oil Tank

Unit Description

A 1,000-gallon aboveground waste machinery oil tank is located on the east side of Building 170.

Wastes Managed

Waste machinery oil is managed in the tank.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.28 BUILDING 171

6.28.1 SWMU 171-1: Incinerator

Unit Description

This incinerator was primarily used to incinerate nonhazardous refuse at Lockheed. This unit was included in the facility's 1980 Part A application; however, Lockheed subsequently indicated that the unit was mistakenly identified as a hazardous waste unit, and should be considered a solid waste incinerator.[40] No indication of the years of operation was found in file material.[37, 59, 40]

The process design capacity of the incinerator was twenty gallons per hour, according to the revised Part A submitted on December 21, 1984, or one ton per hour, according to the original Part A.[37, 59]

Wastes Managed

According to Lockheed, this incinerator was primarily used to combust general factory refuse such as waste paper and cardboard; however, the facility estimated roughly one quarter of one percent of the estimated total waste was characterized as a RCRA hazardous waste.[40]

The original Part A indicated that the following amounts of hazardous waste were incinerated:

- 10 tons of D001 (Ignitable)
- 4 tons of D002 (Corrosive)
- 1 ton of D003 (Reactive).[37]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Ash from incinerator activities has been observed in a storm runoff drain south of Building 171.[2] Additional information will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

No air permitting information was available during the file review. The release potential will be determined during the VSI.

6.29 BUILDING 174

6.29.1 SWMU 174-1: Spray Paint Booth (6)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.30 BUILDING 179

6.30.1 SWMU 179- 1 - Metal Wastewater Sump

Unit Description

The unit is located at Building 179 and is constructed of concrete. The sump has a 600-gallon capacity and is unlined.[25]

Wastes Managed

The unit receives overflow from the metals waste sumps at Building 182 (SWMU 182-Metal Process Waste Sumps). The waste streams managed may include beryllium, chromium, caustics, acids, and solvents (TCE and TCA).[25]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.30.2 SWMU 179-2 Former Cyanide Destruction Unit

Unit Description

This former unit was comprised of two mixing tanks, storage tanks, and a chlorine cylinder used in the treatment process. The unit began operating in 1983, and it was decommissioned in 1988.[2]

Wastes Managed

The unit managed wastewater containing less than 5 mg/l cyanide.[2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Closure and post-closure information has been submitted to the City of Sunnydale and DTSC. Closure was granted by DTSC on May 14, 1996.[2] Additional information will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.31 BUILDING 181

6.31.1 SWMU 181-1 Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.31.2 SWMU 181-2 Silver Retention Sump

Unit Description

This unit, comprised of three adjacent sumps connected by piping, is located south of Building 181. It covers an area of 6 feet by 13 feet by 5 feet. The unit is lined with bricks. It was hydroblasted in the late 1980s, and the walls were described as being in fair condition.[25]

Wastes Managed

The sump received wastes from the testing lab that was present in Building 181. Other wastes the sump may have received include photographic development chemicals, used hydraulic fluids, and solvents.[25]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be assessed during the VSI.

Surface Water Release Potential

The release potential will be assessed during the VSI.

Air Release Potential

The release potential will be assessed during the VSI.

6.32 BUILDING 182

6.32.1 SWMU 182-1: Plating Area (1)

See discussion of a Plating Area in Section 6.1.1.[1]

6.32.2 SWMU 182-2: Spray Paint Booth (8)

See discussion of Spray Paint Booths in Section 6.1.2.[1]

6.32.3 SWMU 182-3: Degreasers (5)

See discussion of Degreasers in Section 6.1.3.[1]

6.32.4 SWMU 182-4: Plating Waste Tank

Unit Description

No information about this unit was found in file material. A detailed description of the unit will be requested during the VSI.

Wastes Managed

The unit receives wastewater from plating operations in Building 182.[83] Additional information on the unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

The capacity of the tank was exceeded as a result of a release from plating process operations during the October 1989 earthquake. Approximately 200 gallons flowed across pavement into a sump at Building 179.[83] Additional information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.32.5 SWMU 182-5: Former Air Scrubbers

Unit Description

Air scrubbers formerly located on the roof of the building managed air from the chemical processing shop.[15] The unit was dismantled in 1994. Additional information on the unit will be requested during the VSI.

Wastes Managed

Information on the unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.32.6 SWMU 182-6: Former Floor Grating

Unit Description

The floor grating was associated with the chemical processing shop.[15] The unit may have been dismantled in 1994. Additional information on the unit will be requested during the VSI.

Wastes Managed

Information on the unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.32.7 SWMU 182-7: Former Boiler Room Sump

Unit Description

The boiler sump was cleaned during the dismantling of the chemical processing area.[15] The unit was dismantled in 1994. Additional information on the unit will be requested during the VSI.

Wastes Managed

Wastes that had accumulated in the sump were sampled and found not to be characteristically hazardous.[15] Information on the unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.32.8 SWMU 182-8: Former Wastewater USTs (3)

Unit Description

No information about these former USTs was found in file material. A detailed description of the unit will be requested during the VSI.

Wastes Managed

Information on the unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

The USTs were removed in 1993.[15] Additional information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.32.9 SWMU 182-9 Acid Retention Sump

Unit Description

This sump was located south of Building 182. It was constructed of concrete and was 6 feet by 3 feet by 6 feet in area, with a capacity of approximately 108 cubic feet.[2, 25]

Wastes Managed

The unit may have managed wastes from the former beryllium shop. The waste streams managed may have included beryllium, chromium, caustics, acids, and solvents (TCE and TCA).[25]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.32.10 SWMU 182-10: Metal Process Waste Sumps (3)

Unit Description

Three sumps are is located south of Building 182.[2, 25] A description of the sumps will be requested during the VSI.

Wastes Managed

The sumps may have managed wastes from the former beryllium shop. The waste streams managed may have included beryllium, chromium, caustics, acids, and solvents (TCE and TCA).[25]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.32.11 SWMU 182-11: Waste UST

Unit Description

Tank 182-1 has a 10,000 gallon capacity.[52] A description of the tank will be requested during the VSI.

Wastes Managed

The tank has managed waste beryllium.[52] Dates of operation for this unit will be requested during the VSI.

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.33 BUILDING 183

6.33.1 SWMU 183-1 Degreaser (1)

See discussion of a Degreaser in Section 6.1.3.[1]

6.34 BUILDING 186

6.34.1 AOC 186-1: Leaded Gas UST

A 750-gallon tank was located at the southeast corner of Building 186. It was removed in 1983, and hydrocarbon contamination was suspected. Four soil borings were installed near the location of the tank to a depth of 18 feet, but samples were collected to a depth of only 11 feet bgs. A maximum of 490 ppm TPH was detected, and toluene and xylenes were detected at <10ppm.[25]

In 1988, four soil borings were completed near an active 560-gallon diesel UST and the former location of the 750 gallon gasoline UST. Measured TPH concentrations were 490 mg/kg. In 1993, TPH as gasoline was detected in groundwater at 19,400 µg/l, and TPH as diesel was detected at 50 µg/l. A maximum concentration of 2,000,000 µg/l was measured in groundwater at the site at an unknown sampling date. In 1993, the diesel tank was removed.[2]

6.35 BUILDING 187

6.35.1 SWMU 187-1 Waste Coolant Oil UST

Unit Description

This tank was located at the southeast corner of Building 187. The tank had a 3,000-gallon capacity. The tank was removed in 1987, when hydrocarbon contamination was suspected. Soil and groundwater sampling was conducted near the tank.[2, 25] Results of sampling will be requested during the VSI.

Wastes Managed

The tank managed waste coolant oil.[25]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Samples collected near the unit contained 61 ppb 1,1,1-TCA, 50 ppm volatile hydrocarbons in groundwater, and 96 ppm 1,1,1-TCE in soil.

Remedial Actions

The tank was removed in 1987. Additional information will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.36 BUILDING 188

6.36.1 SWMU 188-1 Spray Booth (1)

See discussion of Spray Booths in Section 6.1.2.[1]

6.37 BUILDING 195B

6.37.1 SWMU 195B-1 Spray Booth (1)

See discussion of Spray Booths in Section 6.1.2.[1]

6.37.2 SWMU 195B-2 Degreaser (1)

See discussion of Degreasers in Section 6.1.3.[1]

6.38 BUILDING 562

6.38.1 SWMU 562-1 Degreaser (1)

See discussion of Degreasers in Section 6.1.3.[1]

6.38.2 SWMU 562-2 Wastewater Treatment System

Unit Description

The unit was located on the eastside of Building 562. The system included two 3,000-gallon fiberglass lined steel USTs (WT-562-1 and WT 562-2); four underground sumps, and two ASTs.[2]

Wastes Managed

The system managed wastewater, which may have contained ignitable or corrosive wastes and solvents.[2]

Release Controls

Information on the unit will be requested during the VSI.

History of Release

Sampling results for soil near tanks WT 563-1 and WT 562-2 indicated that no metals were present above regulatory levels. Groundwater sampling in the vicinity of the tanks has detected Freon 11 at 5 µg/l.[2]

Remedial Actions

The two USTs were removed in May 1989. Additional information will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.39 SURFACE IMPOUNDMENT CLUSTER

6.39.1 SWMU Surface Impoundment Cluster-1: Evaporation Ponds

Unit Description

Two hazardous waste surface impoundments began operation in 1983 and were closed in 1985. The combined capacity of these impoundments was 1,141,100 gallons per year. Details about the unit are provided below:

Wastewater Flow:[7]	1) Process solutions 358,000 gallons per year 2) Cooling Tower Blowdowns 783,000 gallons per year
Average Net Evaporation:[7]	44 inches per year
Pond Area Required:[7]	0.95 acres
Pond Size:[7]	5 ft depth, 115 ft width, 185 ft length
Pond Surface:[7]	0.98 acres for both ponds
Freeboard:[7]	2 ft
Total Holding Volume:[7]	127,650 ft^3 at 3ft level
Retention Time:[7]	Approximately 300 days

Wastes Managed

Waste managed in this unit was typically acidic in nature and contained heavy metals. Process waters, including cooling tower blowdown, etching, chemical milling, and plating operations, were held in the ponds, and standing liquid was allowed to evaporate. The resulting metal hydroxide sludge precipitate was pumped once a year and disposed off site.

Release Controls

The impoundments were double lined with 36 mil hypalon liners. Each pond had an interstitial leachate collection system and a lysimeter to detect and collect leakage. Two feet of freeboard were available. According to Lockheed, this freeboard was adequate protection against a 100-year storm. The banks of the ponds were one foot above the flood plain.[7,2]

History of Release

The following releases were documented:

- West evaporation pond: release beneath both impoundment liners
- Punctured liner in the east pond anchor trenches
- Upper liner seam leak
- Berm spills
- Overflow plumbing leak.[1]

Remedial Actions

Samples collected from between the hypalon liner and the clay base contained levels of copper ranging from 375 mg/kg to 1,600 mg/kg, and chromium levels ranging from 115 mg/kg to 140 mg/kg. The leak was subsequently repaired, and contaminated materials were excavated and disposed at an unknown location. The area around the leak was flushed with water to remove any remaining soluble metals, and the pond was restored to service.[1]

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.39.2 SWMU Surface Impoundment Cluster-2: Holding Ponds

Unit Description

Two surface impoundments are located on the north end of the Lockheed facility. They have been in operation since 1983 and are classified as Class II impoundments. The capacity of the combined units is 950,000 gallons.[1,2] See Figure 11 for a schematic of the Surface Impoundment Cluster.

Wastes Managed

Rinsewaters and quenching waters from electroplating are managed in this unit.[1,2]

Release Controls

These ponds are single lined with hypalon. Additional information on the unit will be requested during the VSI.

History of Release

Information on the unit will be requested during the VSI.

Remedial Actions

Information on the unit will be requested during the VSI.

Soil/Groundwater Release Potential

The release potential will be determined during the VSI.

Surface Water Release Potential

The release potential will be determined during the VSI.

Air Release Potential

The release potential will be determined during the VSI.

6.40 STORM DITCH 001

6.40.1 AOC Storm Ditch 001-1

In June of 1990, approximately 2,000 gallons of chilled solution containing 200 ppm nitrate and an unknown concentration of diethylaminoethanol was released when a chilled water line was ruptured. The water entered Drainage Ditch 001, which empties into a wetland area. Drainage Ditch 001 was diked with dirt to contain the release. Several hundred gallons of solution pooled in a flatland area. Material released was pumped from the ditch and pooled area. No characterization data of the waste was located during the file review; however, soil samples were collected from the standing liquid at the pipe break, the drainage ditch, the flatland past the berm, and the wetlands bird pond.[76] Additional information will be requested during the VSI. See Figure 10 for a depiction of the spill area and sampling locations.

7.0 EXPOSURE PATHWAYS AND HUMAN AND ENVIRONMENTAL RECEPTORS

7.1 Surface Water

The Lockheed facility is located south of San Francisco Bay and Guadalupe Slough. Wetlands are located within the facility boundary, and along the western property line. Limited information on the proximity of surface waters other than the Bay and Slough are present in the file material. Sampling data from the wetlands and drainages from the facility will be requested during the VSI. Insufficient information is currently present in the file material to determine exposure pathways and receptors for surface water.

7.2 Groundwater

Groundwater beneath the facility is contaminated from site industrial activities. Groundwater is impacted by VOCs and metals to a depth of 55 ft bgs. A groundwater extraction system has been operational at the facility since 1992. Limited information on the effectiveness of the groundwater extraction system is present in file material. Additional information on the extraction system and plume migration will be requested during the VSI.

7.3 Air

Limited information on air releases or permits obtained by the facility is present in the available file material. Many of the degreasers and spray booths have discharges to the atmosphere. Information on the air emissions at the facility will be requested during the VSI.

7.4 Surface Soil

Surface soil at the site has become contaminated from industrial activities conducted at the facility. Sampling activities have detected significant contamination at several locations with subsequent soil excavation. File material did not address whether all areas of soil contamination have been identified, sampled and remediated. The facility is fenced; therefore, only industrial worker scenarios are probable for soil exposure pathways. Additional information will be requested at the time of the VSI.

8.0 VISUAL SITE INSPECTION

8.1 Purpose of the Visual Site Inspection

A VSI is conducted after the initial information gathering step of the RFA process is complete. The purpose of the VSI is to obtain information that was not completely disclosed in the file review by visiting the facility. During the VSI, the focus is to identify SWMUs and collect visual evidence of releases at the facility. The information gathered during the VSI is evaluated along with the information gathered during the Preliminary Review step to determine the probability that a release has occurred at the facility.

8.2 Summary of the Visual Site Inspection

This section will be completed after the performance of the VSI.

9.0 SUGGESTIONS FOR FURTHER ACTION

Suggestions for further action at this facility will be determined based on the findings of the VSI.

10.0 REFERENCES

1 Environmental Priorities Initiative Preliminary Assessment. Prepared by Ecology and Environment, Inc. Dated December 31, 1990.

2 Source Characterization and Plume Delineation Report. Prepared by McLaren/Hart, Inc. Dated August 24, 1999.

3 Investigation of Contaminant Sources and Assessment of Remedial Measures for Soils and Groundwater at Building 170. Prepared by McLaren Environmental Engineering. Dated July 22, 1988.

4 Semi-Annual Groundwater Monitoring Report for August 2000 through January 2001. Prepared by Safety-Kleen Consulting. Dated March 30, 2001.

5 Hydrogeological Assessment Report. Prepared by Brown and Caldwell. Dated January 1987, revised February 1987.

6 Site 14E Final Site Assessment Report. Prepared by Radian Corporation. Dated August 31, 1987.

7 Operation Plan of Lockheed Process Wastewater Treatment/Reclamation Facility. Prepared by Facilities Engineering, Lockheed Missiles & Space Co., Inc. Dated February 23, 1983.

8 Subsurface Site Investigation, Buildings 563 and 564. Prepared by IHI Environmental. Dated September 29, 1995.

9 Draft Hazardous Waste Facility Permit. Prepared by California Department of Health Services. Not dated.

10 Letter, from Dwight Hoenig, DHS, to George Tomer, Lockheed, re: Notice of Violation. Dated June 25, 1986.

11 Letter, from Jon Benjamin, LeBoeuf, Lamb, Greene & MacRae, to Terri Beattie, Lockheed, re: Notification of Underground Contamination at Plant 1, Building 104. Dated February 4, 2000.

12 Letter, from Matt Moses, McLaren Hart, Inc., to Allen Lund, Lockheed, re: Results of Soil Sampling in Storm Ditch 002. Dated September 16, 1998.

13 Results of Additional Investigation and Excavation at the Building 109 Service Station Site, Final. Prepared by Roy F. Weston, Inc. Dated April 19, 1990.

14 Extraction Well Effectiveness Evaluation and Groundwater Modeling Report. Prepared by McLaren Hart. Dated November 8, 1995.

15 Building 182 Chemical Processing Shop & Area 179 Post-Closure Report. Prepared by Lockheed. Dated March 1994.

16 Letter, from Allen Lund, Lockheed, to Alec Naugle, re: LMMS "Source Characterization and Plume Delineation Report dated August 24, 1999. " Dated November 2, 1999.

17 Letter, from Matt Moses, McLaren Hart, Inc., re: Results of Confirmation Soil Sampling in Storm Ditch 002. Dated February 2, 1999.

18 Letter, from Steve Carson, McLaren Hart, to Allen Lund, re: Well Abandonment Report. Dated January 9, 1998.

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23 Site 14E Hydrogeologic Assessment Report. Prepared by Radian Corporation. Dated August 31, 1987. Dated August 16, 1987.

24 Soil Excavation and Sampling East of Building 170. Prepared by McLaren Environmental Engineering. Dated November 1988.

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26 Remedial Effectiveness Evaluation and Semi-Annual Groundwater Monitoring Report for February 2001 through July 2001. Prepared by Cameron-Cole. Dated October 2001.

27 Letter, from H. K. Willard, to Dwight Hoenig, Lockheed. Dated October 20, 1986.

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29 Soil Pollution Characterization Report. Prepared by McLaren. Dated February 2, 1990.

30 Phase III Groundwater Characterization. Prepared by McLaren. Dated April 1990.

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34 Letter from E.A. Thompson, Lockheed, to Jeff Zelikson, EPA, re: Information Regarding Potential Releases from SWMUs. Dated 1987

35 Letter from Alex Naugle, RWQCB, to Allen Lund, Lockheed, re: Transmittal of Order No. 00-124, Updated Site Cleanup Requirements and Rescission of Order No. 88-013. Dated December 6, 2000.

36 Letter from Mark C. Posson, Lockheed, to Alec Naugle, California Regional Water Control Board, re: Divestiture of Lockheed Martin Corporation, Missiles and Space Property, Sunnyvale, CA. Dated February 21, 2001.

37 Letter from A.L. Hubbard, Lockheed, to EPA, re: Attached Part A Hazardous Waste Permit Application. Dated November 19, 1980.

38 Letter from Howard K. Hatayama, DHS Toxic Substances Control Program, to M.C. Posson, Lockheed, re: Application for Variance from the Hazardous Waste Facility Permit Requirements (Buildings 114 and 71). Dated June 19, 1990

39 Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: well water analysis, listing Lockheed as probable cause of discharge. Dated September 7, 1989.

40 Letter from W.C. Kossack, Lockheed, to H. Seraydarian, DHS Hazardous Materials Management Section, re: Hazardous Waste Permit Application/waste incinerators. Dated October 30, 1981.

41 Letter from W.C. Kossack, Lockheed, to Debbie Robinson, EPA, re: Revised Hazardous Waste Permit Application (EPA Form 3510-3). Dated July 28, 1983.

42 Letter from H. Seraydarian, DHS Toxics and Waste Management Division to W.C. Kossack, Lockheed, re: Hazardous Waste Permit Application/waste incinerators. Dated September 28, 1984.

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44 Letter from H. Seraydarian, DHS Toxics and Waste Management Division, to Richard P. Wilcoxan, DHS Toxic Substances Control Division, re: Notice--Lockheed in violation of State regulations governing generators of hazardous waste. Dated February 29, 1994.

45 Letter from Roger B. James, California Regional Water Control Board, W.C. Kossack, Lockheed, re: Attached annual groundwater monitoring program evaluation. Dated June 27, 1985.

46 Letter from Roger B. James, California Regional Water Control Board, to W.C. Kossack, Lockheed, re: Proposal to test and begin use of west evaporation pond. Dated September 11, 1985.

47 Letter from H. Kirk Willard, Lockheed, to Kimberly J. Hall, Ecology and Environment, Inc., re: Supplemental information requested for preliminary assessment. Dated December 7, 1990.

48 Letter from H.K. Willard, Lockheed, to Michael T. Feeley, EPA, re: December 13, 1985 letter from EPA. Dated December 17, 1985.

49 Quarterly Monitoring Report prepared by McLaren/Hart Inc. for Lockheed, re: Monitoring of Plant 1 Site. Dated June 22, 2000.

50 Letter from A.R. Stankunas, Lockheed, to Louis Goldsmith, Regional Water Quality Control Board, re: Drain Line Closure Without Soil Sampling. Dated July 2, 1993.

51 Letter from A.R. Stankunas, Lockheed, to Bruce Wolf, Lockheed, re: Drain Line Closure in Building 182. Dated July 8, 1993.

52 Letter Dwight Hoenig, DHS Toxic Substances Control Division, Lockheed, to H.K. Willard, Lockheed, re: Denial of variance permit. Dated May 28, 1986.

53 Hazardous Materials Discharge Notification, prepared by R. Staricha, Department of Public Safety, re: Well water detection of oil and grease leak. Dated September 26, 1989.

54 Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Earthquake and discharge of 200 gallons of Chromic acid from plating tank. Dated October 19, 1989.

55 Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Possible release from underground tank. Dated October 20, 1989.

56 Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Leaks into storm drains. Dated October 23, 1989.

57 Letter from Roger B. James, California Regional Water Control Board, to W.C. Kossack, Lockheed, re: Proposal to test and begin use of west evaporation pond. Dated September 20, 1985.

58 Compliance Evaluation Inspection, Lockheed Missiles and Space Company, Inc. For fiscal years 1985-1986.

59 EPA Hazardous Waste Permit Application, contact: W.C. Kossack, Lockheed, re: description of hazardous waste materials. Dated December 21, 1984.

60 Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Severed cooling line, discharge of 2,000 gallons to drainage ditch. Dated June 12, 1990

61 EPA Inspection Report and Verification Call Sheet, prepared by Tamara Jo Brode, Field Inspections Section, EPA, for Lockheed. Dated September 9, 1982.

62 Letter from Allen J. Fund, Lockheed, for John Robertson, California Regional Water Quality Control Board, re: Notification of Unauthorized Release of Coolant form Building 170 Sump. Dated November 14, 1997.

63 Operating Plan for the Central Wastewater Treatment Plant prepared by Hazardous Waste Management Branch, California State Department of Health Services. Form I.A.1.b. Revised March, 1985.

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65 Letter from Howard K. Hatayama, DHS Toxic Substances Control Program, for Joel C. Suty, Lockheed, re: Closure for hazardous waste line. Dated June 6, 1991.

66 Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Earthquake and discharge of 200 gallons of Chromic acid from plating tank. Dated October 19, 1989.

67 Letter from Marty Laporte, Lockheed, for Daniel Getreu, Bureau of Fire Prevention, re: Final Report on Soil Sampling and Removal of Contaminated Soil. Dated February 25, 1992.

68 Letter from James Scott Bullock and Charlene F. Williams, DHS Toxic Substances Control Program, re: Report of Violation. Dated April 20, 1990.

69 Letter from M.C. Posson, Lockheed, for Ron Staricha, Department of Public Safety, re: Results of Building 151 Subfloor Core Samples. Dated May 22, 1989.

70 Letter from Miguel A. Ortega, Ecova, for Louis Goldsmith, California Regional Water Quality Control Board, re: Contaminated soil at facility. Dated July 27, 1989.

71 Letter from Harry Seraydarian, EPA, for Lockheed, re: Loss of interim status for all affected land disposal units. Dated October 19, 1989.

72 Letter from Mark C. Posson, Lockheed, for Ron Staricha, Department of Public Safety, re: Report on July 5, 1990 Incident (case number 11687). Dated July 19, 1990.

73 Letter from Mark C. Posson, Lockheed, for Loretta Barsamian, California Regional Water Quality Control Board, re: Lockheed divestiture. Dated September 2, 1999.

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75 Letter from Luz T. Castillo and Charlene F. Williams, DHS Toxic Substances Control Division, re: Report of Violations and Schedule for Compliance. May 6, 1988.

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79 Letter from Tim Costello, McLaren Environmental Engineering, for Louis Goldsmith, California Regional Water Control Board, re: Lockheed Sunnyvale Contaminant Source Identification Report. Dated January 31, 1989.

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81 Letter from Lynne Anderson, Lockheed, for Sonia S. Low, DHS Toxic Substances Control Division, re: Surface Impoundment Post Cleanup Sampling Results and Analysis. Dated November 19, 1992.

82 Letter from M.O. Ghassemi, Lockheed, for Louis Goldsmith, California Regional Water Control Board, re: Water Quality Monitoring Program Report. Dated November 19, 1992.

83 Letter from M. Posson, Lockheed, to R. Staricha, Re: Notification of Incidents Resulting From Earthquake, November 1, 1989.

84 Letter from M. Posson, Lockheed, to L. Castillo, DHS, Re: Inadvertent Release fro Waste Tank 013-2, August 3, 1988.

85 Letter from M. Posson, Lockheed, to R. Wheeler, Re: November 23 and December 2, 1099 Incident Report, December 8, 1988.

86 Letter from M. Posson, Lockheed, to R. Staricha, Re: Incident of January 3, 1990, January 18, 1990.

87 Letter from M. Posson, Lockheed, to R. Staricha, Re: Follow-up on Inadvertent Release fro Waste Tank 013-2, April 27, 1990.

88 Addendum to Post-Closure Report, Building 104

89 Remedial Measures Workplan for Impacted Soils at the Former Building 104 facility, Lockheed Martin Corporation, Missiles and Space, Sunnyvale, California. Dated march 17, 2000

90 Letter from H. Willard, Lockheed, to R. Staricha, City of Sunnyvale, Re: Lab analyses from Block 7, Building 151, April 10, 1990.

91 People of the State of California v. Lockheed Missiles & Space Co., Inc. Superior Count of the State of California for the County of San Francisco, re: Complaint for Civil Penalties. Dated October 24, 1986.

92 Inspection Report for Lockheed Missiles & Space Co. Dated April 5, 1990.

93 http://www.weatherbase.com/weather. Temperature and precipitation information for Sunnyvale and Mountain View, CA.

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97 City of Mountain View webiste http://www.ci.mtnview.ca.us/citydepts

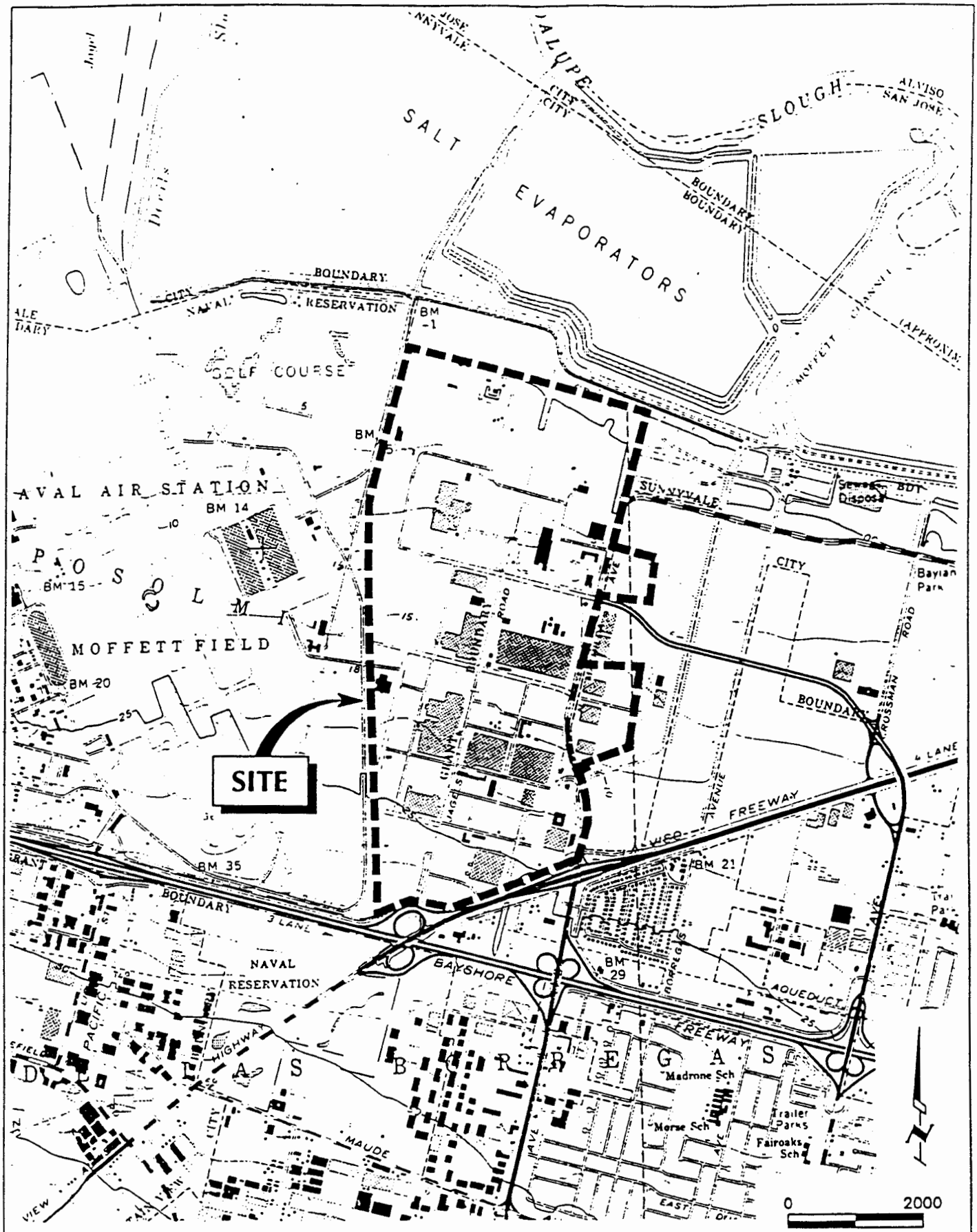
APPENDICES

APPENDIX A

FIGURES

FIGURE 1

LOCKHEED SITE LOCATION MAP



SOURCE: USGS 7.5 Minute Series (topographic), Mountain View Quadrangle, California.

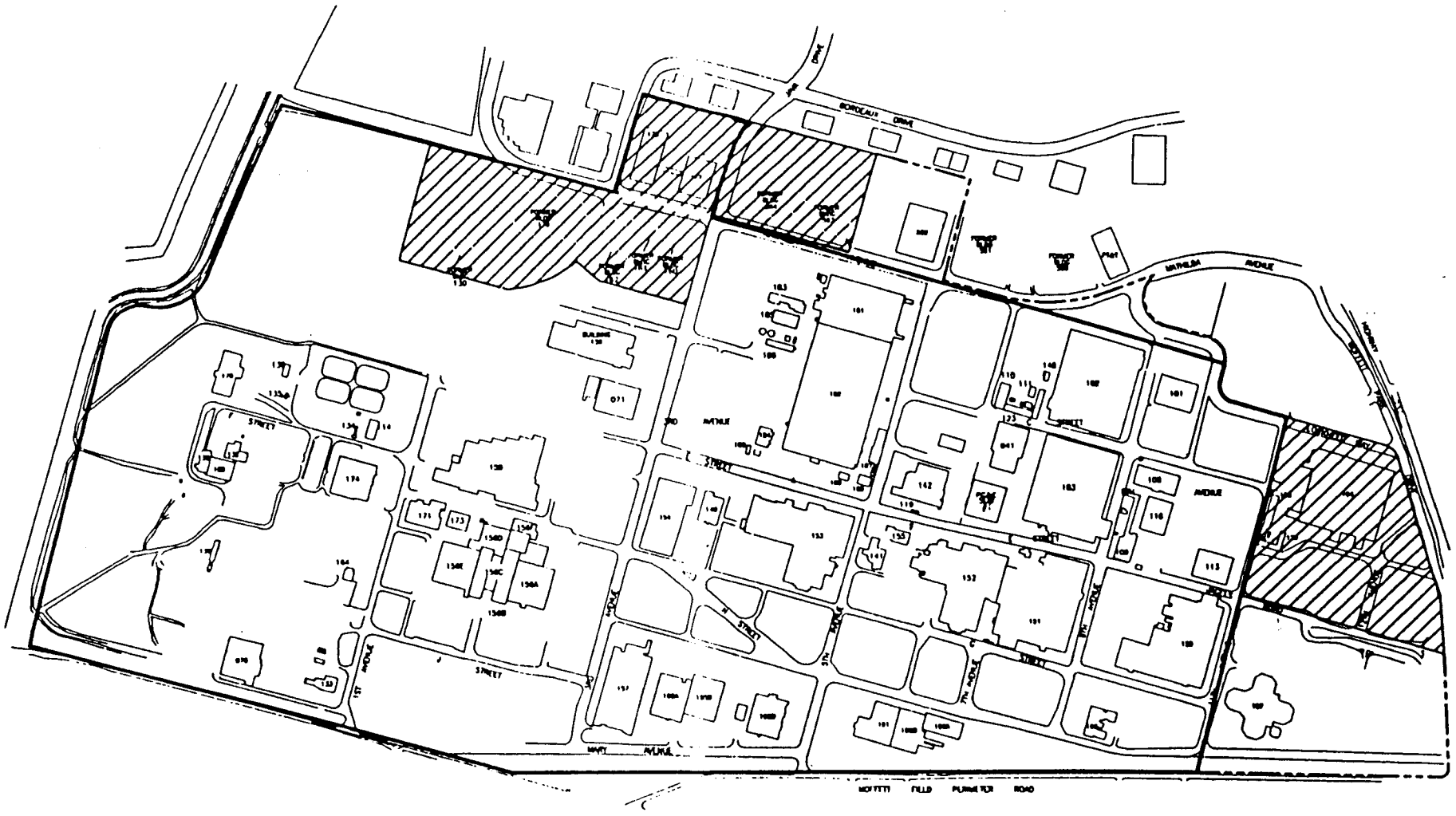
McLaren Hart
ENVIRONMENTAL ENGINEERING CORPORATION

FIGURE 1

SITE LOCATION MAP
LMMS PLANT ONE SITE

FIGURE 2

LOCKHEED YEAR 2000 SITE MAP



LEGEND

- FORMER SITE BOUNDARY
- CURRENT SITE BOUNDARY
- DIVESTED PROPERTIES

0 1000

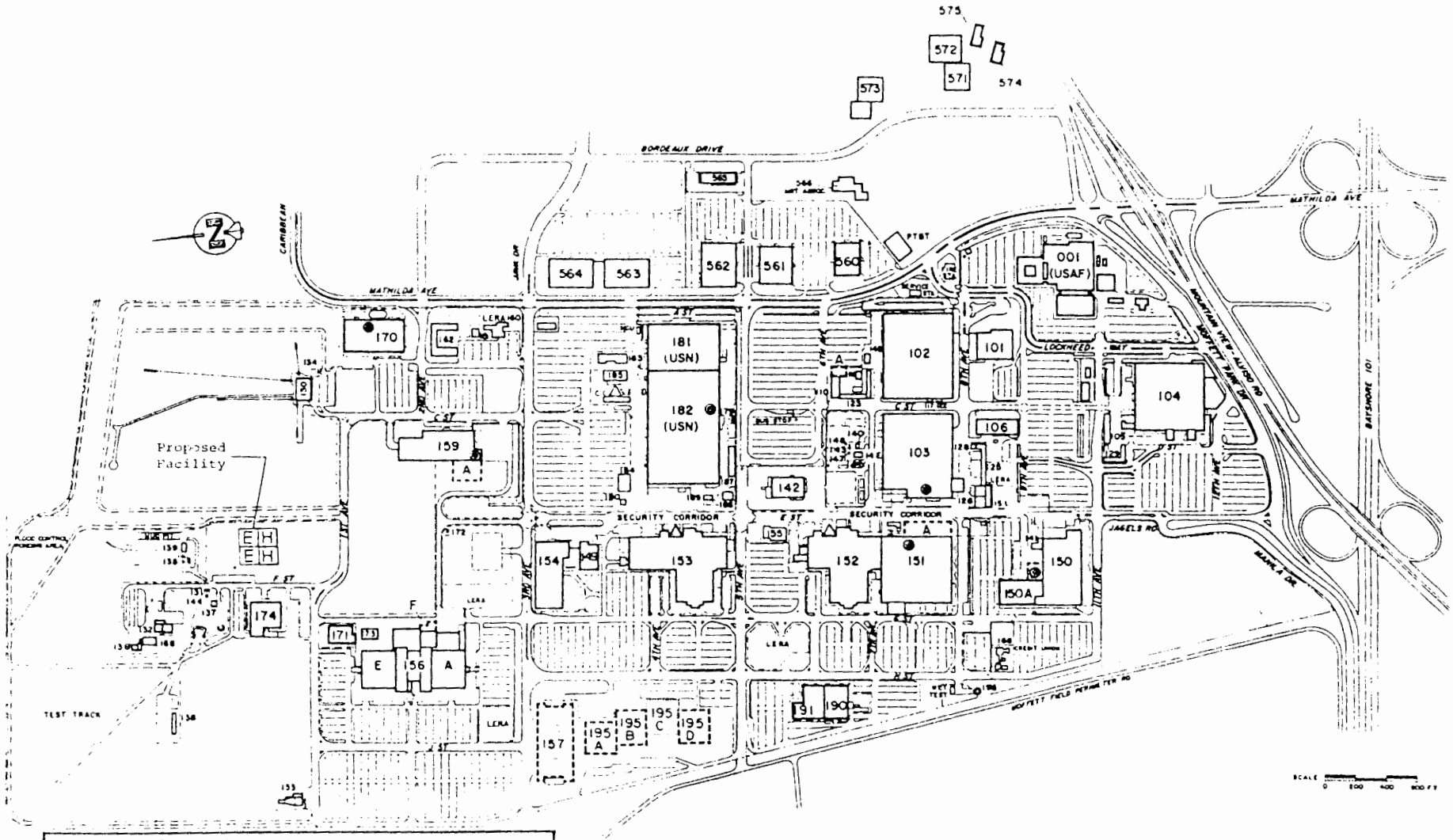
FEET

LOCKHEED PLANT ONE FACILITY	
FIGURE 2 SITE BOUNDARIES AND DIVESTED PROPERTIES	
SCALE 1" = 1000'	DATE 11/22/00

792701-29

FIGURE 3

LOCKHEED YEAR 1981 SITE MAP



LEGEND:

- ● Plating Facility
- △ Cooling Towers For Rinse Water Reclamation
- E Evaporation Pond
- H Holding Pond

LOCKHEED MISSILES & SPACE COMPANY INC
SUNNYVALE CALIFORNIA

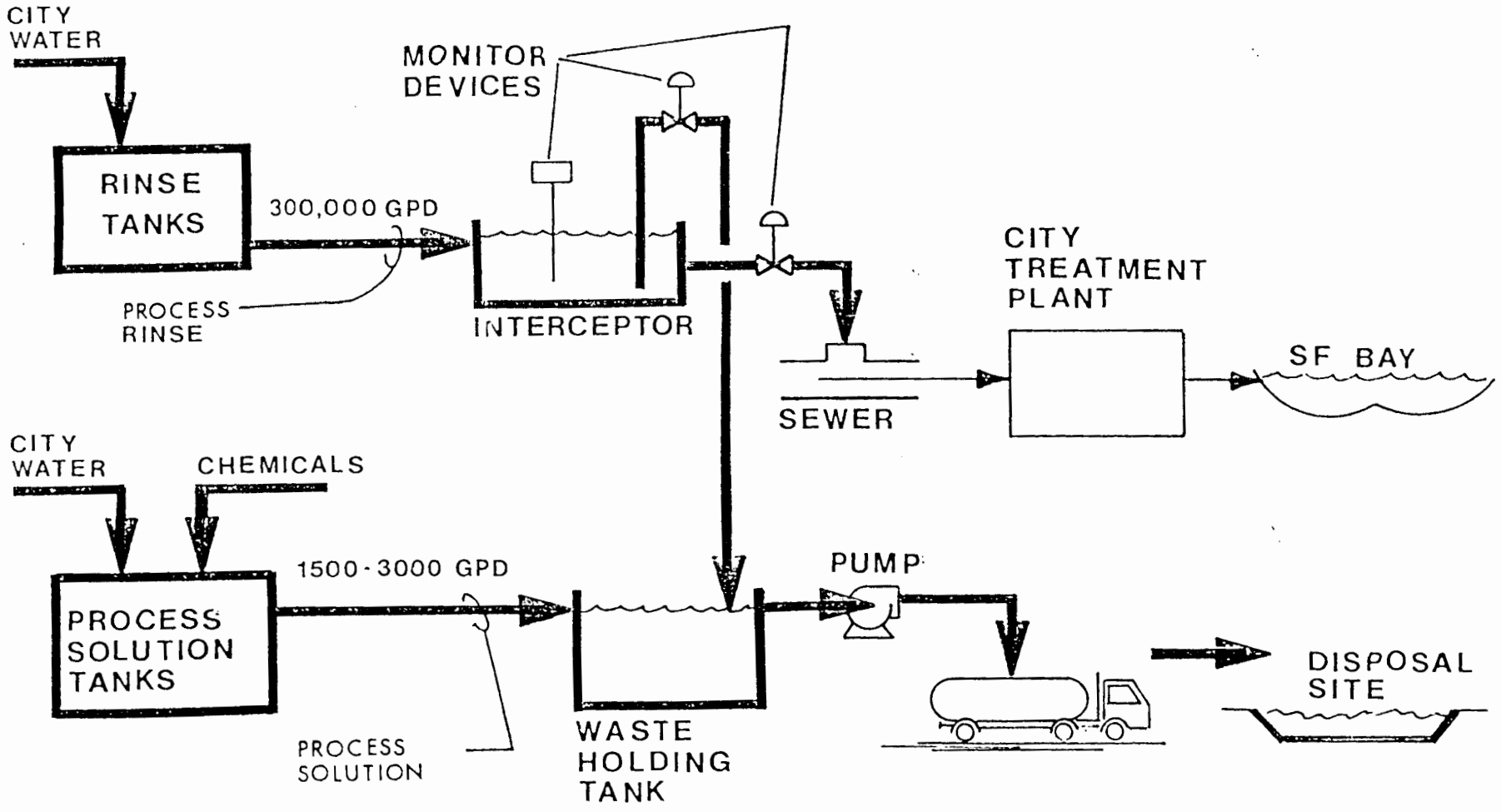
SUNNYVALE SITE PLAN

CPL-100-CS

FIGURE 4

FIGURE 4WASTEWATER HANDLING AND DISPOSAL DIAGRAM, 1981

FIGURE 4 PRESENT METHOD OF PROCESS WASTEWATER DISPOSAL



LMSC PLANT ENGINEERING

FIGURE 5

PROPOSED FUTURE WASTEWATER HANDLING AND DISPOSAL DIAGRAM, 1981

PROPOSED METHOD OF PROCESS WASTEWATER DISPOSAL

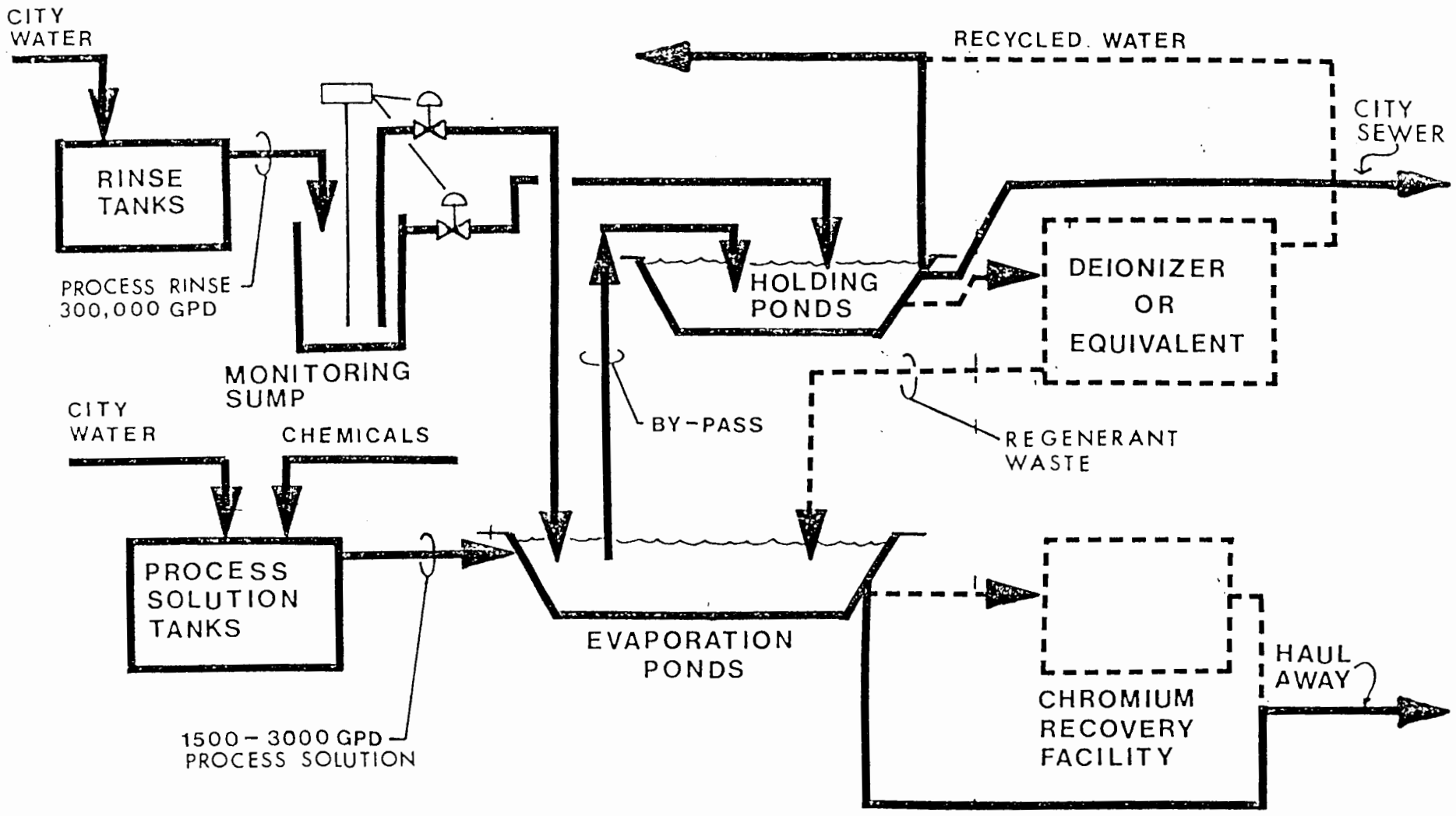
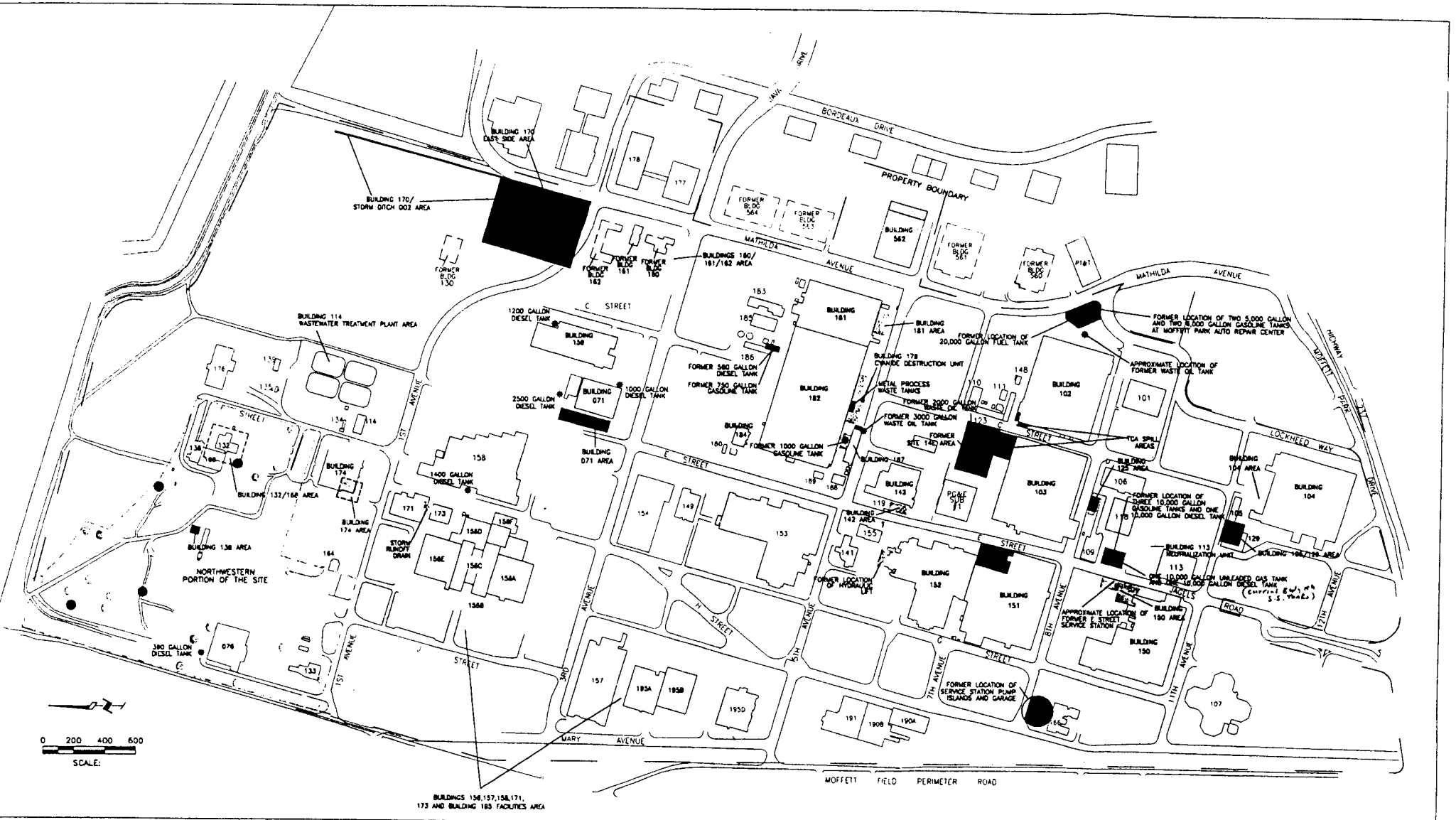


FIGURE 6

PRESENT AND PAST UST LOCATIONS AT LOCKHEED, 1999



LEGEND

ACTIVE PETROLEUM UST

REMOVED PETROLEUM UST

KNOWN SOIL CONTAMINATION (LIKELY SOURCE OF GROUNDWATER CONTAMINATION)

KNOWN SOIL CONTAMINATION (UNLIKELY SOURCE OF GROUNDWATER CONTAMINATION)

NEGLIGIBLE SOIL CONTAMINATION DETECTED

PROCESS AREAS WHERE SOIL SAMPLING HAS OCCURRED ONLY IN CONJUNCTION WITH CLOSURE ACTIVITIES

REVISED FIGURE 2
LOCATION OF POTENTIAL SOURCE AREAS
LMMS PLANT ONE SITE

MACTEC

OCTOBER 1999

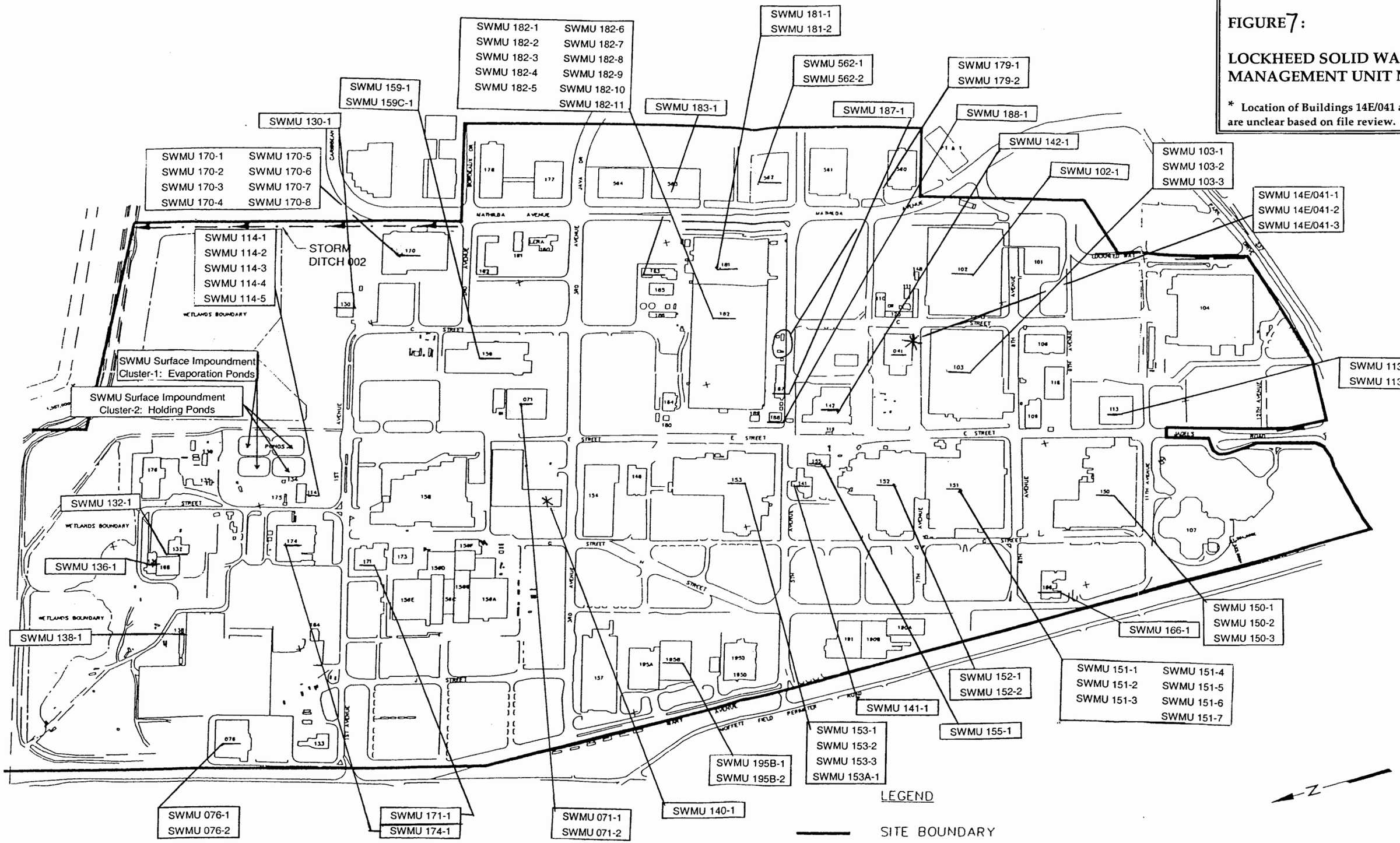
FIGURE 7

SWMU MAP

FIGURE 7:

LOCKHEED SOLID WASTE MANAGEMENT UNIT MAP

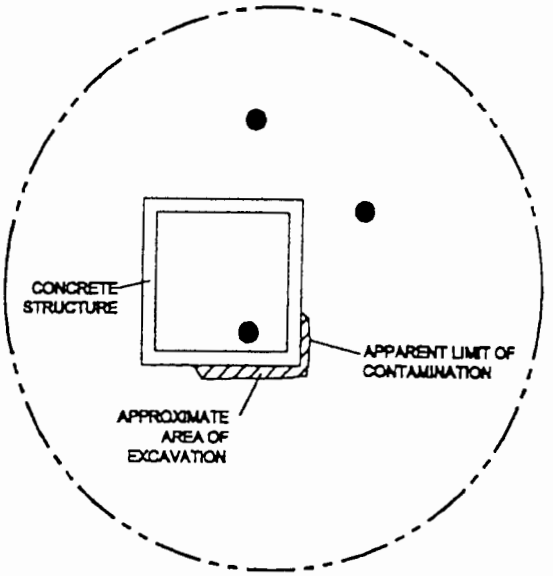
* Location of Buildings 14E/041 and 140 are unclear based on file review.



McLaren

FIGURE 8

BUILDING 104 AOC 1 AND 2 LOCATIONS



DETAIL A

VLT-4 (GROUNDWATER ONLY)

VLT-3 (GROUNDWATER ONLY)

VLT-2 (SOIL AND GROUNDWATER)

VLT-1 (SOIL AND GROUNDWATER)

SEE DETAIL A

VLT-5 (SOIL ONLY) (BENEATH VAULT)

FORMER LMMS BUILDING 104

LEGEND:

VLT-1 ● APPROXIMATE LOCATION OF SOIL BORING

NOT TO SCALE

McLaren Hart Inc.

AREA 2

FORMER LMMS BUILDING 104 SHOWING EXCAVATED AREA AND SOIL AND GROUNDWATER SAMPLE LOCATIONS

FIGURE 9

BUILDING 151 LAYOUT AND SAMPLE LOCATIONS

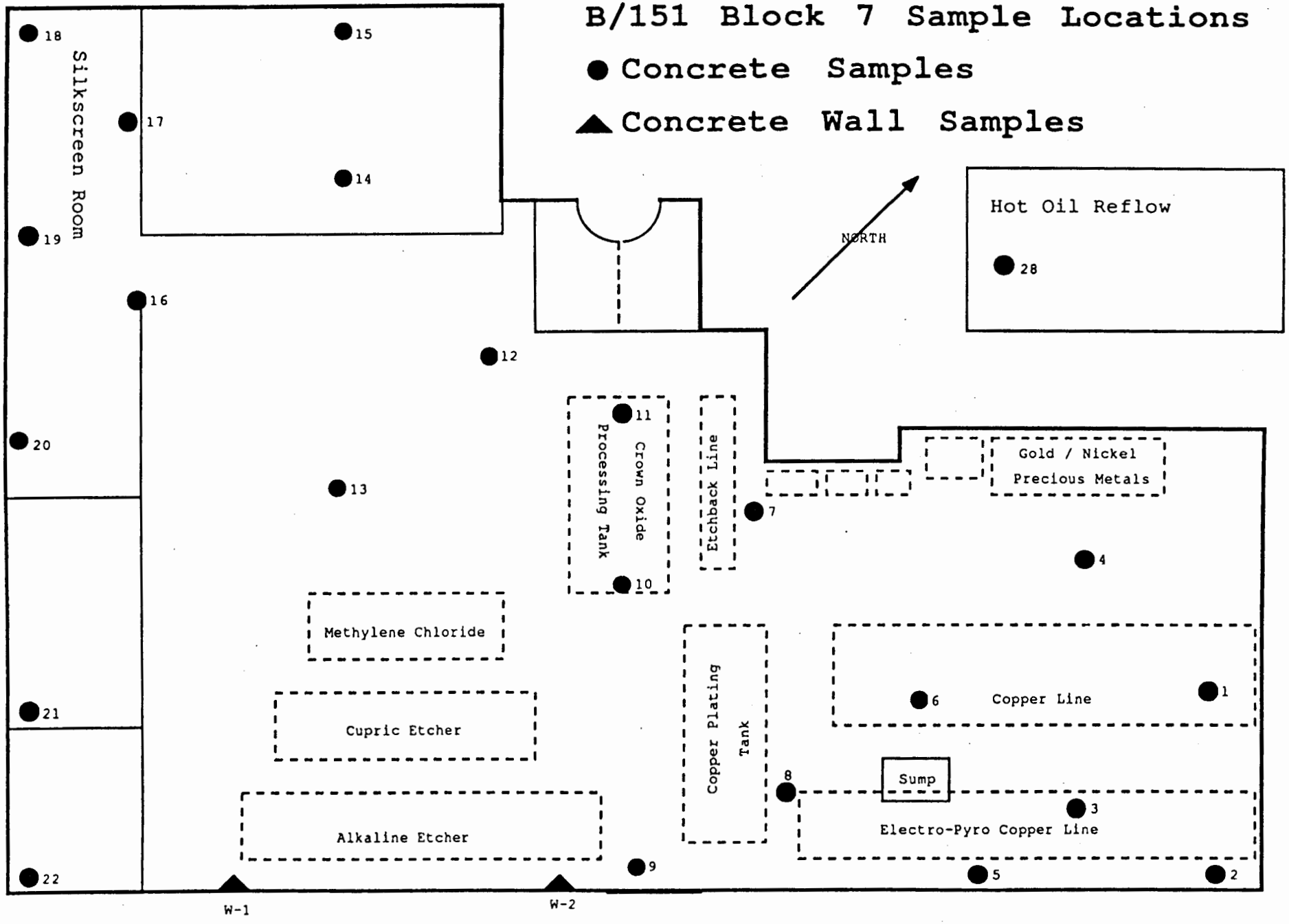
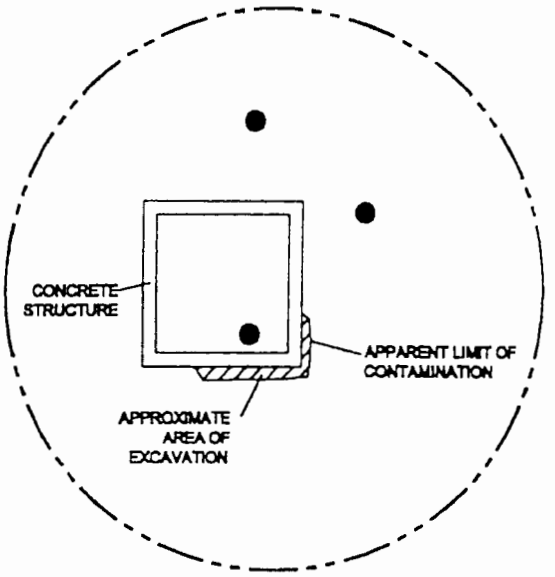

B/151 Block 7 Sample Locations
Concrete Samples
Concrete Wall Samples
Silkscreen Room
Hot Oil Reflow
NORTH
Chrom Oxide Processing Tank
Etchback Line
Gold / Nickel Precious Metals
Methylene Chloride
Cupric Etcher
Alkaline Etcher
Copper Plating Tank
Copper Line
Sump
Electro-Pyro Copper Line
W-1
W-2
Figure Not to Scale

FIGURE 8

BUILDING 104 AOC 1 AND 2 LOCATIONS



DETAIL A

VLT-4
(GROUNDWATER ONLY)

VLT-3
(GROUNDWATER ONLY)

VLT-2
(SOIL AND GROUNDWATER)

VLT-1
(SOIL AND GROUNDWATER)

SEE DETAIL A

VLT-5
(SOIL ONLY)
(BENEATH VAULT)

FORMER LMMS
BUILDING 104

LEGEND:

VLT-1 ● APPROXIMATE LOCATION OF SOIL BORING

NOT TO SCALE

McLaren Hart Inc.

AREA 2
FORMER LMMS BUILDING 104
SHOWING EXCAVATED AREA AND
SOIL AND GROUNDWATER
SAMPLE LOCATIONS

FIGURE 9

BUILDING 151 LAYOUT AND SAMPLE LOCATIONS

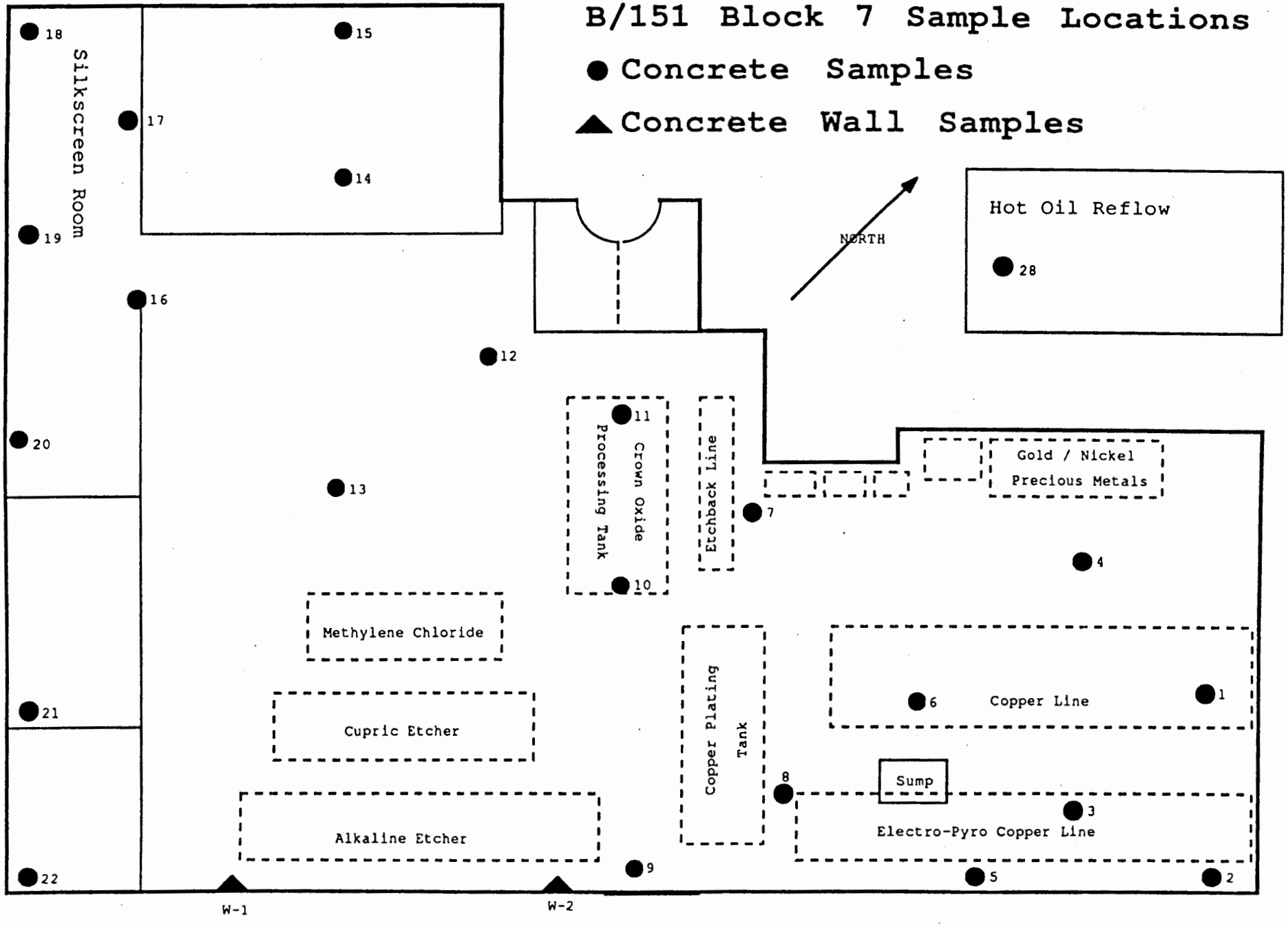
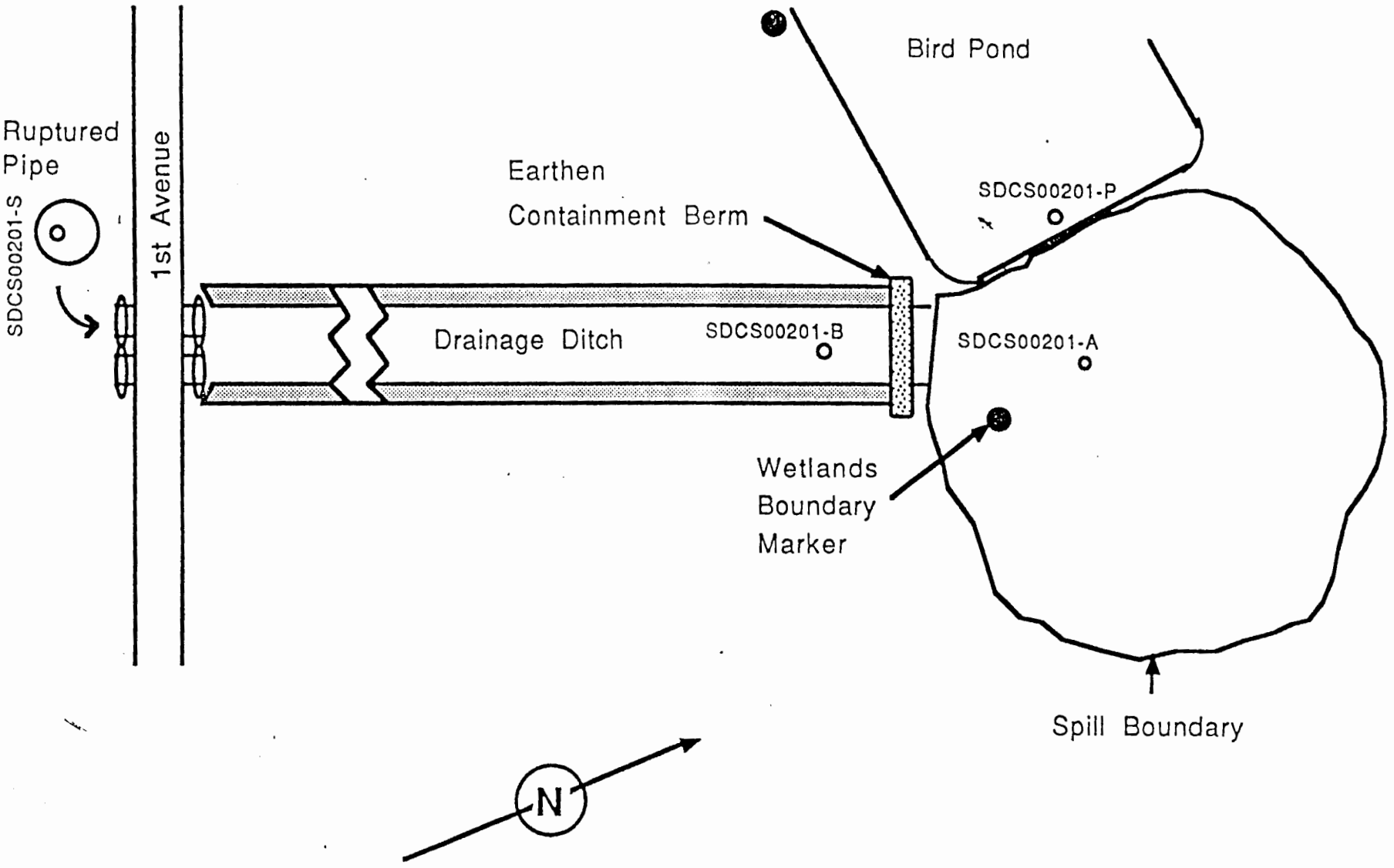


Figure Not to Scale

FIGURE 10

BUILDING 159 SPILL REPORT DIAGRAM



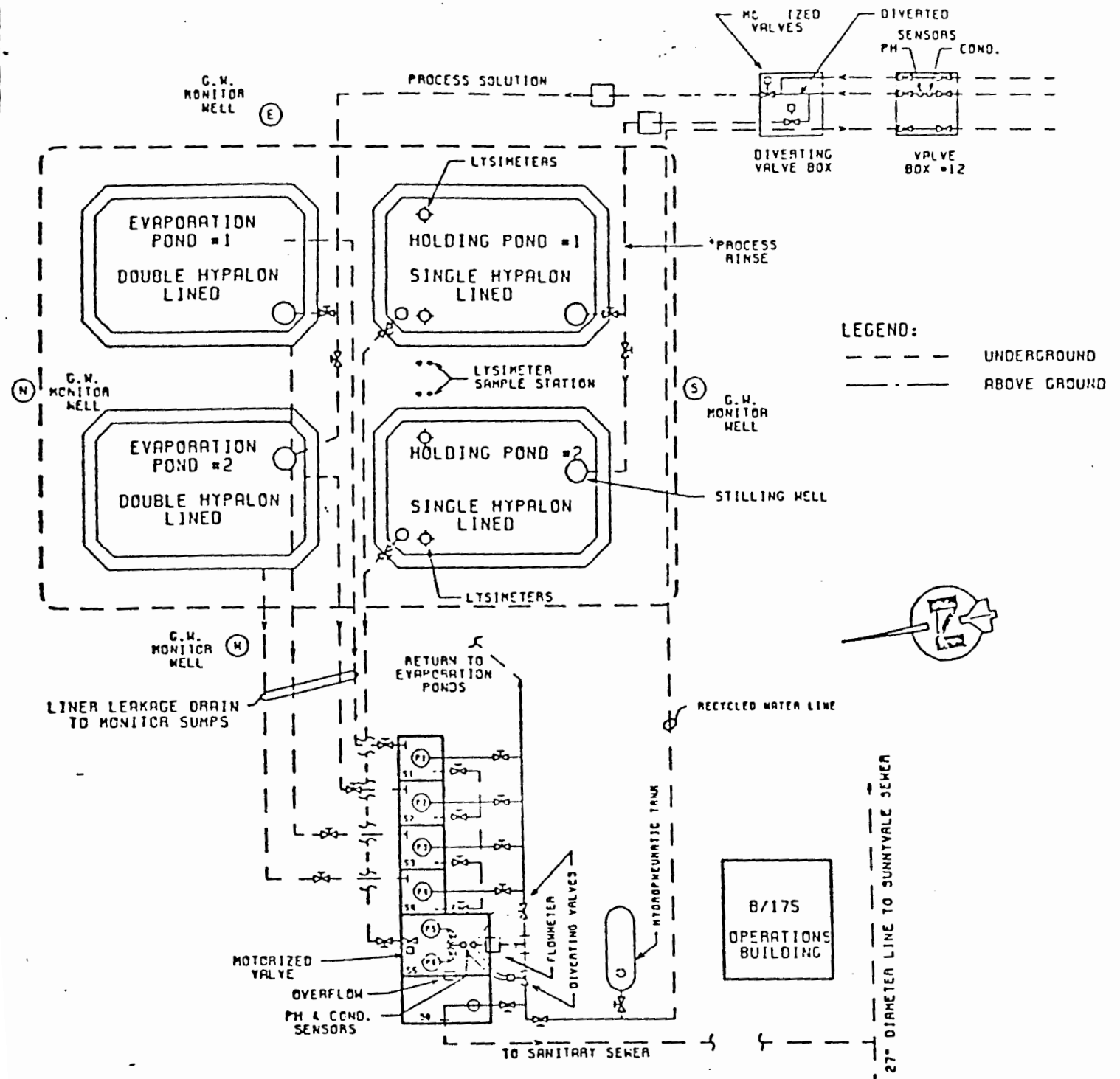
Building 159 Chilled Water Release Area

Drawing is not to scale

O Sample Locations

FIGURE 11

SURFACE IMPOUNDMENT CLUSTER LAYOUT



1. S1 & S2 COLLECT LEAKAGE FROM UPPER LINER OF PONDS E1 & E2.
2. S3 & S4 COLLECT LEAKAGE FROM LOWER LINER OF PONDS E1 & E2.
3. S5 MOTORIZED VALVE IS FLOAT OPERATED ON GRAVITY FLOW LINE TO MAINTAIN LEVEL IN SUMP S.
4. MOTORIZED VALVES ON DIVERTING VALVE BOX AND TRANSFER PUMP DISCHARGE AT S5 ARE PH & CONDUCTIVITY CONTROLLED. PH & CONDUCTIVITY ARE RECORDED.
5. PUMPS ON S1-S4 ARE FLOAT CONTROLLED AND MONITORED ON EVENT RECORDER.

LOCKHEED MISSILES & SPACE COMPANY, INC. A SUBSIDIARY OF LOCKHEED AIRCRAFT CORPERATION SUNNYVALE, CALIFORNIA	ORGN. 45-52	DATE
	DRAWN M.A. MCGRATH	4/5/82
	CHECKED M.J. LAVELLE	4/5/82
TILE: SIMPLIFIED SCHEMATIC DIAGRAM OF B/175 PROCESS WASTEWATER HOLDING & EVAPORATION POND DISTRIBUTION & CONTROL SYSTEM	APPROVED M.J. LAVELLE	4/16/82
	APPROVED	
OCATION LOCKHEED BUILDING 175		
ACILITY 1 / ORGN. 45-52 / SCALE NONE / SHT. 7 OF 7	E	A

APPENDIX B

INFORMATION NEEDS LIST

INFORMATION NEEDS LIST

The following information needs were identified during a review of the file material. This information will be requested from the facility prior to the VSI:

1. Please provide a description of the following processes, the amount of raw material used, the amount and type of wastes generated and how the wastes were managed: etching, chemical milling; metal plating; degreasing; spray painting, chemical processing, photoprocessing and printed circuit board manufacturing.

2. Please provide all submitted Biennial (or Annual) Hazardous Waste Reports required by EPA or the State of California.

3. Please describe waste management processes prior to 1980. Please include specific information regarding:

   - Wastewater management prior to surface impoundment construction
   - Changes in waste management practices after the evaporation tanks were closed
   - Changes in waste management practices associated when the HMPU began operation
   - Waste management practices for cyanide wastes during the facility's history
   - Waste management practices for beryllium wastes during the facility's history.

4. Please identify the amount and types of wastes that are accepted at the Central Wastewater Treatment Plant (CWTP) from other portions of the facility. Specifically, identify which, if any, plating units historically or currently discharge plating wastes to locations other than the CWTP.

5. Provide a list of all air and water permits for the facility, including past permits. In addition, please provide information about air emission sources pertinent to hazardous waste containers and tanks (i.e., Title 40, Parts 264/265, Subparts AA, BB, and CC).

6. Please identify locations of all satellite accumulation areas, including the locations where wastewater treatment sludges, spent solvents, and any solvent heels from solvent recovery units have been generated and accumulated.

7. Please identify the time frame during which the solvent recovery units operated at the facility.

8. Please provide information about specific locations, regulatory status, and contents of the all waste tanks at the facility. Known waste tanks include:

   - Building 103 Plating Waste Tanks (WT103-2) (WT103-3) (WT103-4)
   - Building 170 Underground Beryllium Waste Tank (WT170-5)
   - Building 182 Plating Waste Tank
   - Site 14E Waste Oil Tank.

9. Please provide the March 6, 1981 Interim Status Document issued by the California Department of Health and Services (DHS).

10. Please provide the March 10, 1986 revised Part A submission.

11. Please provide the DHS-certified closure plan for the evaporation ponds and any information pertaining to confirmatory sampling with regards to closure of these units.

12. Please provide a history of groundwater investigations at the facility.

13. Indicate whether the wells installed in the late 1960s were required by state, county, or city regulations.

14. Please provide information with regards to any off-site groundwater contamination, and information regarding the decision to install a groundwater extraction system in 1992, including which plume(s) the facility is attempting to contain with this system.

15. Please verify current or past existence of wastewater oxidation ponds owned by the City of Sunnyvale to the north of the facility.

16. Please identify the number of current employees at the Lockheed facility.

17. Please provide a list of all the buildings, both current and historical, that have existed at the site.

18. Please provide information regarding how much of the facility property is still owned by Lockheed, and whether any of the divested land is currently leased or operated by Lockheed.

19. Please provide the address of the parcel US Navy owned 48-acre parcel.

20. Please provide information about which chemicals are used in the chemical processing areas and the types of chemical processing that takes place in these units.

21. Please provide a list of all sources of cooling towers and list current and past waste handling practices.

22. Please provide information about the types and quantities of any hazardous waste accepted from off site. Please include any information on state or federal waste codes associated with these wastes, date span during which the facility received the waste, and disposition of these waste streams.

23. Please provide information to assess the impact of facility's activities on the nearby wetland areas. In addition provide any evaluations that have been done with regards to facility impacts on endangered or threatened wildlife in the vicinity.

24. Please provide information about the types of paint used currently and historically at the facility.

25. Please describe any history of flooding at the facility.

26. Please describe solid waste generation.

27. Indicate if PCBs or other TSCA wastes were generated or managed at the facility.

28. Please describe use of radioactive materials and indicate if RCRA mixed waste is generated.

29. Please provide any information on contaminants in subsurface gas.

30. Indicate how much and what kind of waste was used in the cyanide destruction units, and why the facility chose to close the unit.

31. Please provide the following building-specific information for all buildings listed in the table that begins on the next page:

    - Dates of operation
    - Description/list of building activities
    - Description/list of wastes managed

- Release controls
- Release history and release potential to groundwater, soil, surface water, subsurface gas, and air.

32. For each SWMU or AOC listed below, please provide the following information:

- Dates of operation
- Description of unit (i.e., capacity and construction materials)
- Description/list of wastes managed including waste codes
- Release controls
- Release history and release potential to groundwater, soil, surface water, subsurface gas, and air.

Buildings Identified During File Review	
Building No.	**Identified SWMUs/AOCs**
11C	No SWMUs or AOCs identified
14E/041	SWMU 14E/041-1: Spray Paint Booths (3) SWMU 14E/041-2: Building 14E Former Hazardous Waste Container Storage Facility SWMU 14E/041-3: Solvent Recovery System AOC 14E-1: Waste Oil Sump/Underground Waste Oil Tank
071	SWMU 071-1: Plating Area (1) SWMU 071-2: Spray Paint Booths (4) AOC 071-1: Solvent Cleaning Operations (5) AOC 071-2: Solvent Storage Tanks/USTs (2)
076	SWMU 076-1: Spray Paint Booth (1) SWMU 076-2: Degreaser (1)
101	No SWMUs or AOCs identified
102	SWMU 102-1: Sanitary Wastewater Collection System
103	SWMU 103-1: Plating Area (1) SWMU 103-2: Degreasers (4) SWMU 103-3: Plating Waste Tanks (WT103-2) (WT103-3) (WT103-4)
104	AOC 104-1: Soil Contamination Area 1 AOC 104-2: Soil Contamination Area 2
105	No SWMUs or AOCs identified

Building No.	Identified SWMUs/AOCs
106	No SWMUs or AOCs identified
107	No SWMUs or AOCs identified
109	AOC 109-1: USTs (4)
110	No SWMUs or AOCs identified
111	No SWMUs or AOCs identified
112	No SWMUs or AOCs identified
113	SWMU 113-1: Degreasers (4) SWMU 113-2: Neutralization Unit
114	SWMU 114-1: Andco Treatment Unit SWMU 114-2: Clarifier/Sludge Thickening Unit/Filter Press SWMU 114-3: Former HMPU SWMU 114-4: Cyanide Destruction Unit SWMU 114-5: Hazardous Waste Container Storage Area
119	No SWMUs or AOCs identified
123	No SWMUs or AOCs identified
125	No SWMUs or AOCs identified
128	No SWMUs or AOCs identified
129	No SWMUs or AOCs identified
130	SWMU 130-1: Degreaser (1)
132	SWMU 132-1: Solvent Waste Drum
133	No SWMUs or AOCs identified
134	No SWMUs or AOCs identified
136	SWMU 136-1: Spray Paint Booth (1)
138	SWMU 138-1: Vehicle Maintenance Facility
139	No SWMUs or AOCs identified
140	SWMU 140-1: Spray Paint Booth (1)
141	SWMU 141-1: Spray Paint Booth (1)
142	SWMU 142-1: Sanitary Sewer Catch Basin

Building No.	Identified SWMUs/AOCs
143	No SWMUs or AOCs identified
145	No SWMUs or AOCs identified
146	No SWMUs or AOCs identified
147	No SWMUs or AOCs identified
149	No SWMUs or AOCs identified
150	SWMU 150-1: Plating Area (1) SWMU 150-2: Spray Paint Booth (1) SWMU 150-3: Degreaser (1)
150A	No SWMUs or AOCs identified
151	SWMU 151-1: Plating Area (1) SWMU 151-2: Spray Paint Booths (7) SWMU 151-3: Degreasers (11) SWMU 151-4: Methylene Chloride Still SWMU 151-5: Waste Chemical Storage Area SWMU 151-6: Former Waste Diversion System SWMU 151-7: Former CopperPretreatment Facility
152	SWMU 152-1: Spray Paint Booths (2) SWMU 152-2: Hoist Sump
153	SWMU 153-1: Plating Area (1) SWMU 153-2: Spray Paint Booths (5) SWMU 153-3: Degreasers (7)
153A	SWMU 153A-1: Spray Paint Booth (1)
154	No SWMUs or AOCs identified
155	SWMU 155-1: Spray Paint Booth (1)
156	No SWMUs or AOCs identified
157	No SWMUs or AOCs identified
158	No SWMUs or AOCs identified
159	SWMU 159-1: Spray Paint Booth (1)
159C	SWMU 159C-1: Spray Paint Booth (1)
160	No SWMUs or AOCs identified

Building No.	Identified SWMUs/AOCs
161	No SWMUs or AOCs identified
162	No SWMUs or AOCs identified
164	No SWMUs or AOCs identified
165	No SWMUs or AOCs identified
166	SWMU 166-1: Former Automotive Service Station
168	No SWMUs or AOCs identified
170	SWMU 170-1: Plating Area (1) SWMU 170-2: Spray Paint Booths (4) SWMU 170-3: Degreasers (2) SWMU 170-4: Waste Beryllium Tank SWMU 170-5: Baghouse Dust Area SWMU 170-6: Process Clarifiers (2) and Underground Sumps (4) SWMU 170-7: Storm Ditch 002 SWMU 170-8: Waste Machinery Oil Tank
171	SWMU 171-1: Incinerator
172	No SWMUs or AOCs identified
173	No SWMUs or AOCs identified
174	SWMU 174-1: Spray Paint Booths (6)
175	No SWMUs or AOCs identified
177	No SWMUs or AOCs identified
178	No SWMUs or AOCs identified
179	SWMU 179-1: Metal Wastewater Sump SWMU 179-2: Former Cyanide Destruction Unit
180	No SWMUs or AOCs identified
181	SWMU 181-1: Spray Paint Booth (1) SWMU 181-2: Silver Retention Sump

Building No.	Identified SWMUs/AOCs
182	SWMU 182-1: Plating Area (1) SWMU 182-2: Spray Paint Booths (8) SWMU 182-3: Degreasers (5) SWMU 182-4: Plating Waste Tank SWMU 182-5: Former Air Scrubbers SWMU 182-6: Floor Grating SWMU 182-7: Former Boiler Room Sump SWMU 182-8: Former Wastewater USTs (3) SWMU 182-9: Acid Retention Sump SWMU 182-10: Metal Process Waste Sumps (3) SWMU 182-11: Waste UST
183	SWMU 183-1: Degreaser (1)
184	No SWMUs or AOCs identified
185	No SWMUs or AOCs identified
186	AOC 186-1: Leaded Gas UST
187	SWMU 187-1: Waste Coolant Oil UST
188	SWMU 188-1: Spray Booth(1)
189	No SWMUs or AOCs identified
190	No SWMUs or AOCs identified
191	No SWMUs or AOCs identified
194	No SWMUs or AOCs identified
195A	No SWMUs or AOCs identified
195B	SWMU 195B-1: Spray Booth (1) SWMU 195B-2: Degreaser (1)
195D	No SWMUs or AOCs identified
196	No SWMUs or AOCs identified
528	No SWMUs or AOCs identified
560	No SWMUs or AOCs identified
561	No SWMUs or AOCs identified
562	SWMU 562-1: Degreaser (1) SWMU 562-2: Wastewater Treatment System

Building No.	Identified SWMUs/AOCs
563	No SWMUs or AOCs identified
564	No SWMUs or AOCs identified
565	No SWMUs or AOCs identified
566	No SWMUs or AOCs identified
567	No SWMUs or AOCs identified
571	No SWMUs or AOCs identified
572	No SWMUs or AOCs identified
573	No SWMUs or AOCs identified
574	No SWMUs or AOCs identified
575	No SWMUs or AOCs identified
583	No SWMUs or AOCs identified
588	No SWMUs or AOCs identified
1001	No SWMUs or AOCs identified
1002	No SWMUs or AOCs identified
1004	No SWMUs or AOCs identified
1005	No SWMUs or AOCs identified
1006	No SWMUs or AOCs identified
1007	No SWMUs or AOCs identified
1008	No SWMUs or AOCs identified
1009	No SWMUs or AOCs identified
1010	No SWMUs or AOCs identified
1013	No SWMUs or AOCs identified
1016	No SWMUs or AOCs identified
1018	No SWMUs or AOCs identified
1023	No SWMUs or AOCs identified
1024	No SWMUs or AOCs identified

Building No.	Identified SWMUs/AOCs
001 US Air Force	No SWMUs or AOCs identified
Surface Impound-ment Cluster	SWMU Surface Impoundment Cluster-1: Evaporation Ponds SWMU Surface Impoundment Cluster-2: Holding Ponds
Storm Ditch 001	AOC 001: Storm Ditch 001

APPENDIX C

GUIDANCE MANUAL FOR ELECTROPLATING AND METAL FINISHING PRETREATMENT STANDARDS

(EPA440-1-84-091G; PB87-192-597, 6-PAGE EXCERPT)

2. ELECTROPLATING CATEGORICAL PRETREATMENT STANDARDS (40 CFR PART 413)

2.1 AFFECTED INDUSTRY

The Electroplating Standards are applicable to wastewater from any or all of these six specific operations (See the Electroplating Final Development Document).

1. Electroplating
2. Electroless Plating
3. Anodizing
4. Coatings
5. Chemical Etching and Milling
6. Printed Circuit Board Manufacturing

These six electroplating operations are briefly discussed below:

1. Electroplating is the production of a thin surface coating of one metal upon another by electrodeposition. Ferrous or nonferrous basis materials may be coated by a variety of common (copper, nickel, lead, chromium, brass, bronze, zinc, tin, cadmium, iron, aluminum or combinations thereof) or precious (gold, silver, platinum, osmium, iridium, palladium, rhodium, indium, ruthenium, or combinations thereof) metals. In electroplating, metal ions supplied by the dissolution of metal from anodes or other pieces, are reduced on the work pieces (cathodes) while in either acid, alkaline, or neutral solutions.

   The electroplating baths contain metal salts, alkalies, and other bath control compounds in addition to plating metals such as copper, nickel, silver or lead. Many plating solutions contain metallic, metallo-organic, and organic additives to induce grain refining, leveling of the plating surface, and deposit brightening.

2. Electroless Plating is the chemical deposition of a metal coating on a workpiece by immersion in an appropriate plating solution. Electricity is not involved, therefore uniform deposits are easily obtained. Copper and nickel electroless plating for printed circuit boards are the most common operations. In electroless nickel plating the source of nickel is a salt, and a reducer is used to reduce the nickel to its base state. A complexing agent is used to hold the metal ion in solution. Immersion plating, which for purposes of this

regulation is considered part of electroless plating, produces a metal deposit by chemical displacement; however, it is not an autocatalytic process but is promoted by one of the products of the reaction. Immersion plating baths are usually formulations of metal salts, alkalies and complexing agents (typically cyanide or ammonia).

3. Anodizing is an electrochemical process which converts the metal surface to a coating of an insoluble oxide. Aluminum is the most frequently anodized material. The formation of the oxide occurs when the parts are made anodic in dilute sulfuric or chromic acid solutions. The oxide layer begins formation at the extreme outer surface, and as the reaction proceeds, the oxide grows into the metal. Chromic acid anodic coatings are more protective than sulfuric acid coatings and are used if a complete rinsing of the part cannot be achieved.

   Anodizing wastewater typically contains the basis material and either chromic or sulfuric acid. When dyeing of anodized coatings occurs, the wastewaters will contain chromium or other metals from the dye. Other potential pollutants include nickel acetate (used to seal anodic coatings) or other complexes and metals from dyes and sealers.

4. Coatings include chromating, phosphating, metal coloring and passivating. Pollutants associated with these processes enter the wastestream through rinsing and batch dumping of process baths. The process baths usually contain metal salts, acids, bases, and dissolved basis materials. In chromating, a portion of the base metal is converted to a component of the protective film formed by the coating solutions containing hexavalent chromium and active organic or inorganic compounds. Phosphate coatings are formed by the immersion of steel, iron, or zinc plated steel in a dilute solution of phosphoric acid plus other reagents to condition the surfaces for cold forming operations, prolong the life of organic coatings, provide good paint bonding and improve corrosion resistance. Metal coloring involves the chemical method of converting the metal surface into an oxide or similar metallic compound to produce a decorative finish. A variety of solutions utilizing many metals may contribute to the wastestream. Passivating is the process of forming a protective film on metals by immersion in an acid solution, usually nitric acid or nitric acid with sodium dichromate.

5. Etching and Chemical Milling are processes used to produce specific design configurations or surface appearances on parts by controlled dissolution with chemical reagents or etchants. Chemical etching is the same process as chemical milling except the rates and depths of metal removal are usually much greater in chemical milling. The major wastestream constituents are the dissolved basis material and etching solutions.

6. Printed Circuit Board Manufacturing involves the formation of a circuit pattern of conductive metal (usually copper) on nonconductive board materials such as plastic or glass. There are five basic steps

involved in the manufacturing of printed circuit boards: cleaning and surface preparation, catalyst and electroless plating, pattern printing and masking, electroplating, and etching.

Wastewater is produced in the manufacturing of printed circuit boards from the following processes:

a. Surface preparation - The rinses following scrubbing, alkaline cleaning, acid cleaning, etchback, catalyst application, and activation.

b. Electroless plating - Rinses following the electroless plating step.

c. Pattern plating - Rinses following acid cleaning, alkaline cleaning, copper plating, and solder plating.

d. Etching - Rinses following etching and solder brightening.

e. Tab plating - Rinses following solder stripping, scrubbing, acid cleaning, and nickel, gold, or other plating operations.

f. Immersion plating - Rinses following acid cleaning and immersion tin plating.

Additionally, water may be used for subsidiary purposes such as rinsing away spills, air scrubbing water, equipment washing, and dumping spent process solutions. The principal constituents of the wastestreams from the printed circuit board industry are suspended solids, copper, fluorides, phosphorus, tin, palladium, and chelating agents. Low pH values are characteristic of the wastes because of the necessary acid cleaning and surface pretreatment.

In addition to the above operations, the Electroplating Standards also apply to the related operations of alkaline cleaning, acid pickle, and stripping when each operation is followed by a rinse.

2.2 EXCEPTIONS FROM REGULATION COVERAGE

Operations similar to electroplating which are specifically exempt from coverage under the Electroplating Categorical Pretreatment Standards include:

1. Electrowinning and electrorefining conducted as part of nonferrrous metal smelting and refining (40 CFR Part 421);

TABLE 3.1. METAL FINISHING CATEGORY UNIT OPERATIONS (Continued)

Unit Operations	Summary Description of Unit Operations
	oxide or similar metallic compound to produce a decorative finish. Passivating is the process of forming a protective film on metals by immersion in an acid solution, usually nitric acid or nitric acid with sodium dichromate.
5. Etching and Chemical Milling	These operations are used to produce specific design configurations or surface appearances on parts by controlled dissolution with chemical reagents or etchants. Chemical etching is the same process as chemical milling except the rates and depths of metal removal are usually much greater in chemical milling.
6. Printed Circuit Board Manufacturing	This operation involves the formation of a circuit pattern of conductive metal (usually copper) on nonconductive board materials such as plastic or glass. There are five basic steps involved in the manufacturing of printed circuit boards: cleaning and surface preparation, catalyst and electroless plating, pattern printing and masking, electroplating, and etching.
7. Cleaning	This operation involves the removal of oil, grease, and dirt from the basis material using water with or without detergents or other dispersing agents. Acid cleaning is a process in which an acid is used with a wetting agent or detergent to remove oil, grease, dirt, or oxide from the metal surface.
8. Machining	This operation involves the general process of removing stock from a workpiece by forcing a cutting tool through the workpiece, thereby removing a chip of basis material. Machining operations incorporate the use of natural and synthetic oils for cooling and lubrication.
9. Grinding	This operation involves the process of removing stock from a workpiece by the use of a tool consisting of abrasive grains held by a rigid or semi-rigid binder. Natural and synthetic oils are used for cooling and lubrication in many grinding operations.

TABLE 3.1. METAL FINISHING CATEGORY UNIT OPERATIONS

Unit Operations	Summary Description of Unit Operations
1. Electroplating	The production of a thin surface coating of one metal upon another by electrodeposition. Ferrous or nonferrous basis materials may be coated by a variety of common (copper, nickel, lead, chromium, brass, bronze, zinc, tin, cadmium, iron, aluminum or combinations thereof) or precious (gold, silver, platinum, osmium, iridium, palladium, rhodium, indium, ruthenium, or combinations thereof) metals. In electroplating, metal ions supplied by the dissolution of metal from anodes or other pieces, are reduced on the work pieces (cathodes) while in either acid, alkaline, or neutral solutions.
2. Electroless Plating	The chemical deposition of a metal coating on a workpiece by immersion in an appropriate plating solution in which electricity is not involved. Copper and nickel electroless plating for printed circuit boards are the most common operations. Immersion plating, which for purposes of the Metal Finishing regulation is considered part of electroless plating, produces a metal deposit by chemical displacement.
3. Anodizing	An electrochemical process which converts the metal surface to a coating of an insoluble oxide. Aluminum is the most frequently anodized material. The formation of the oxide occurs when the parts are made anodic in dilute sulfuric or chromic acid solutions. The oxide layer begins formation at the extreme outer surface, and as the reaction proceeds, the oxide grows into the metal.
4. Coatings,	Any operation that includes chromating, phosphating, metal coloring and passivating. In chromating, a portion of the base metal is converted to a component of the protective film formed by the coating solutions containing hexavalent chromium and active organic or inorganic compounds. Phosphate coatings are formed by the immersion of steel, iron, or zinc plated steel in a dilute solution of phosphoric acid plus other reagents to condition the surfaces for further processing. Metal coloring involves the chemical method of converting the metal surface into an